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The Personnel Journal

DEVOTED TO INDUSTRIAL PSYCHOLOGY
The Science of Work, the Human Factor in Management and the Satisfactory Adjustment of Individuals to Their Occupations

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News Notes Book Reviews Current Periodicals

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Technopsychology in a Swiss Industry

By Léon Walther, *Institut J. J. Rousseau, Geneva*

(With the coöperation of Gertrude Ehinger and Eric D. Bovet)

Before the War, Léon Walther was a professor of history in Russia. The foundations of his knowledge of industrial psychology were laid during a five-year period following the revolution, when he worked at the bench in a Swiss factory. Here he carefully observed his own and his fellow-laborers' processes of learning and acts of skill, the tools and machines at their disposal, arrangement of parts on the assembly bench, flow of work through the shop, effects of lighting, processes of supervision, and other influences causing variations in output and in satisfactions of the workers. He also read widely about factory organization, scientific management, and the psychology of industry.

Later, as a member of the staff of the Institut J. J. Rousseau, he made investigations at the request of the management of several factories, which resulted in simplification of work and reduction of fatigue, as reported in his volume on Technopsychology of Labor[1]*. More recent studies in an industry manufacturing certain food products are here described.*

This paper describes the difficulties, aims, methods, and results of applying psychological principles and techniques in a century-old factory in Switzerland. The problems were those of personnel classification and placement, simplification of work through time and motion studies, reduction of fatigue, and increase of output without speeding up the workers. The difficulties were (1) the apparent impossibility of introducing improvements, so skillful seemed the workers and so well organized the plant; (2) many workers were beyond the age when habits are readily modified, forty per cent being between 40 and 60 years old; (3) the employees were as well paid as others similarly employed: they were, therefore, without the usual incentive to coöperate in plans for reorganization.

About 230 women workers in 11 departments were studied. They were largely engaged in machine tending or in such manual work as wrapping and packing. Five dexterity tests were used: Dotting (Binet and Vaschide), Tapping, Bead-stringing (Descoeudres), Paper-cutting (Claparède and Walther), and Disk-setting (Walther). Test results were validated by comparison with foremen's ratings,

[1] Léon Walther, *La technopsychologie du travail industriel.* Neuchâtel and Paris, Delachaux et Niestlé S. A. 1926. Pp. xi + 235.

the correlations ranging from .10 to 1.00; median correlation, .80. Compared with norms secured by the *Institut J. J. Rousseau*, average dexterity was 13.4 per cent below that of the adult population of Geneva. Classification by age groups, however, made evident that this was due to the predominance of older individuals.

Two functions of time-study are illustrated: to furnish the starting point for analysis and simplification of tasks; and, later, to establish standards. It is contended that the average or typical worker should be studied rather than the exceptional worker. But how is it possible to decide who is the worker of average ability, since it is unsafe to resort to records of individual output made previous to the studies and the subsequent improvements in technique and training? This dilemma which has puzzled many industrial engineers was solved by reference to the dexterity test scores, which furnished a suitable means of determining which was the average worker on each job, for study.

Tables of percentile scores permitted comparisons of departments as well as individuals. The psychological survey having shown that the age of the workers accounted for a relatively low dexterity rating, various aids to improvement and to conservation of the workers were employed: rest periods, linked movements, automatized movements, variety in work, reorganization of flow of work, and changes in belt-conveyors and work tables to meet the requirements of comfort, convenience and ease of movement.

Changes resulting in better placement and training, improved working conditions, and an increased output of from 30 to 40 per cent without speeding up, are reported.

THE study we are presenting to readers of the PERSONNEL JOURNAL has peculiar interest in that it describes the application of psychology to an organization which has been in existence for more than a hundred years. Obstacles to the introduction of changes were of both a material and psychological nature. It is all the more interesting to see industrial psychology succeed under such unfavorable conditions.

INITIAL DIFFICULTIES AND PROBLEMS

As soon as we began to investigate working conditions at the factory in question, we encountered three main obstacles. The first was that the firm in its methods of work was following traditions which were the result of the thought and experiment of generations which undoubtedly had produced a very well planned organization. While visiting different departments and observing the work of the employees, we often wondered in what way, if any, we could further increase their efficiency. What impressed us most was the almost perfect occupational movements of the women workers, the result of selection and improvement passed on from generation to generation. It was only by proceeding systematically in our psychological analysis, which will be described later, that we were able to introduce noticeable improvements in the operation of the factory.

The second difficulty lay in the advanced age of the workers. Table 1,

based on data from ten departments, clearly illustrates the situation.

Twenty per cent of the workers were between 41 and 45, which are critical years, unfavorable to any change of habit. The age of forty may be taken as about the limit when an individual is still readily able to adapt himself to new conditions. Sixty per cent of the personnel were between 16 and 40 years of age; and forty per cent between 40 and 60. Although the younger element predominated, the large proportion of older workers presented a serious difficulty because of their unwillingness to coöperate in any attempt to modify traditional methods of work.

The third difficulty was the absence of incentive to employee coöperation. Most European manufacturers try to find a solution to the wage problem in the standard of living. Switzerland, a small country, possesses no raw materials and its principal industries are forced to export their products. A protective tariff aggravates the situation by maintaining a high cost of living. The manufacturer thinks he can overcome his difficulties by placing a limit on wage increases. In the factory in which we worked the level of wages had reached or even surpassed local standards. Under such circumstances the workers were not directly interested in reorganization, a serious obstacle to the techno-psychological solution of such problems. Techno-psychology is not supposed to resolve the conflict between capital and labor; it is defined as a science aiming to apply psychology to the technique of human labor. By this definition its field and its limits are clearly determined. Psychological consequences affecting human relations as a result of the contact between labor and capital are subject matter of a different discipline: namely, *social* psychology applied to economics. The *techno*-psychologist tries to keep a neutral position, and to restrict his activities to the purely technical domain. We believe that only on this condition will his technical advice be acceptable to both parties.

TABLE 1

Proportions of women employees in different age groups

AGE	PER CENT
16–20	1
21–25	10
26–30	13
31–35	19
36–40	17
41–45	20
46–50	15
51–55	4
56–60	1

These few introductory remarks as to the conditions under which we had to undertake to work, lead us back to the method used to reorganize the factory in question.

Four problems, as revealed by a study of working conditions in different departments, confronted us. It was necessary to make:

First, a survey of the level of dexterity of the personnel. This was undertaken not so much with a view to occupational selection for no one could be dismissed or hired; but rather to find out in how far each was occupying the place best suited to him. Analyzing the various kinds of work in

different departments, we could establish the degree of motor dexterity required. Hand work needed much dexterity, machine work much less.

Second, a careful study of the operatives' material environment while at work. We wished to learn whether or not seats, tables, and equipment in general met the physical and psychological requirements of work.

Third, a time and motion study. As previously mentioned, we needed to make but few changes in the women's motions; yet the changes we were compelled to make were typical. They will be mentioned later.

Fourth, a study of occupational fatigue and its elimination in so far as possible.

In this article, we shall confine ourselves to an analysis of those problems which have a theoretical as well as a practical value. We shall first describe the survey of a manufacturing plant from the point of view of its workers' manual dexterity, as made with techno-psychological methods which will demonstrate the value of tests in this field. Secondly, we shall see what contribution tests can make to the important subject of time and motion study. Finally, concerning the workers' material environment and their fatigue, we shall give a few concrete instances in which reorganization has resulted in a marked increase in efficiency, thanks to the application of certain psychological laws.

TESTS USED IN THE SURVEY OF OCCUPATIONAL SKILLS

We began our investigation by measuring the motor abilities of all women workers of the departments selected for reorganization. There were about 230 women to whom we administered for that purpose a psychological examination, consisting of five motor tests: dotting, tapping, stringing beads, cutting, disk setting. They have been described from time to time in the *Archives de Psychologie.* (Vol. XIX, 1925, No. 74, p. 166; vol. XXI, 1928, No. 81, p. 5).

The test technique is as follows:

1. DOTTING (Binet and Vaschide).

Materials. Two sheets of paper 20 cm. square. A pattern of one hundred squares of 1 sq. cm. each is printed in the center. A round, blue pencil (Faber) of white wood. A stop-watch measuring fifths of a second.

Procedure. The subject is seated at a table. The sheet is placed before him, and he is given the pencil which he must hold firmly in his right hand. The examiner says: "We are going to examine the speed of your movements. Make a dot in each square as quickly as you can. Begin with this square (pointing to the first square in the left top corner). When you reach this one (pointing to the right top square) pass to the one just below it, and make the second row from right to left. For the third row go from left to right again, and so on, back and forth down to the last square. Take care to make only one dot in each square, and not to skip any. Hold the sheet firmly with your left hand, so it will not slip. Start when I say: 'Go!' Do you understand?"

The examiner starts his stop-watch when the first dot is made, and stops it at the end of the test.

Same procedure for the left hand.

2. TAPPING.

Materials. A piece of white paper about 20 cm. square. The same Faber pencil.

Procedure. "Make dots on this paper with this pencil as fast as you can. Put them anywhere you like, but just remember that I shall have to count them afterwards,

and so try not to put two dots in the same place. Keep your elbow firmly on the table. Start when I say 'Go,' and stop when I say 'Stop!'."

Allow six seconds for the right hand, and six seconds for the left hand.

Count the number of dots.

3. STRINGING BEADS (Descoeudres).

Materials. Thirty glass beads of the same color, cylindrical sections of glass tubing 4 mm. inside diameter and about 8 mm. long. A piece of string, 28 cm. long, with a colored bead at one end, and threaded with a dull-pointed embroidery needle about 5 cm. long.

Procedure. "String these beads as fast as you can, holding the needle in the right hand. Pick up the beads one at a time, with the left hand. String four beads on the needle, slide them to the end of the thread, then take four more beads on the needle, and slide them down the thread, and so on up to the last, as fast as possible." Do not let the subject rest his hand on the table.

The examiner should have a few additional beads at hand for replacing any which may be dropped. Record the length of time taken.

4. PAPER CUTTING (Claparède and Walther).

Materials. A pair of scissors. A sheet of heavy paper, 50 cm. long, on which are printed three black bands, each 6.5 mm. in width. One of these makes a wavy path; the other two are Greek designs, in which the bands meet at right angles. Each bend or section of a given length is numbered for convenience in scoring.

Procedure. "Cut along these lines as fast as you can, without getting off the black. Start when I say 'Go!', and stop when I say 'Stop!'."

Twenty seconds is allowed for each line, starting with the wavy one.

The examiner counts the number of sections cut on each line and adds together the three scores. Each mistake, consisting of cutting through the white (not simply cutting *into* the white, but shortening the distance by cutting *across* the white) counts as an error and is substracted from the total number cut.

5. DISK SETTING (Walther).

Materials. Two pieces of cardboard 30 cm. square, in which 41 holes, 25 mm. in diameter have been cut. The depth of the holes in board A is 2.5 mm., and in board B, 5 mm. Forty-one cylindrical wooden disks like checkers, 23 mm. in diameter and 10 mm. thick. (See fig. 1.) Two or three additional disks should be at hand in case any are dropped.

Procedure. Before each trial, the disks are in the holes of board A. They are to be transferred from board A into the holes of board B as fast as possible. This is done

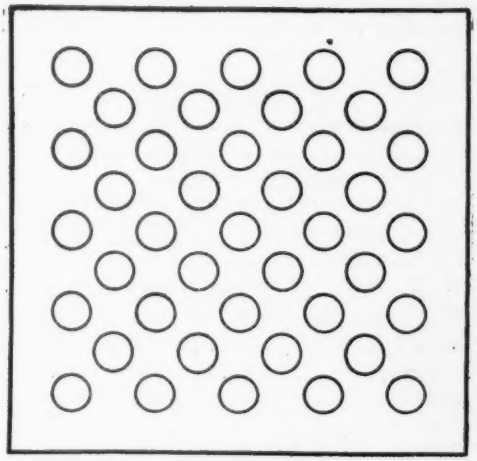

FIG. 1. SHOWING RELATIVE POSITION OF HOLES IN DISK-SETTING BOARD. REDUCED TO ONE TWENTY-THIRD ACTUAL SIZE

three times: once with the right hand (board A is placed to the left of board B); once with the left hand (board A is on the right); once with both hands, each hand taking only one disk at a time (board A is again placed to the left of board B). The disks may be quickly transferred back to board A simply by placing the two boards together and inverting them.

The time required for each trial is recorded.

The order in which the disks are placed does not affect the score, but it is interesting, nevertheless, to note individual differences in this respect as indicative of differences in characteristic traits: whether, for example work is done with system or haphazardly.

VALIDATING THE TESTS

The diagnostic value of our five motor tests had to be determined. Two procedures were possible: (1) a comparison of the workers' rank in the psychological examination with their rank in output in the factory could be made; and (2) the correlation between the result of each test and the rating of the workers by the foreman could be determined. When a large number of workers is involved, it is impossible to compare their respective outputs, for the types of work they have to perform are too varied, even within a single department. It is though, relatively easy to find jobs at which limited numbers of workers are engaged in similar kinds of work. A comparison between the results of the tests and output rating will then give very satisfactory results, as we have stated elsewhere.[1]

TABLE 2

Employees' scores in five psychological tests of motor dexterity correlated with supervisors' ratings

FOREWOMEN	CORRELATIONS	PROBABLE ERROR
Brod	1.00	.00
Hod	.93	.02
Ross	.91	.03
Jeanm	.90	.02
Chab	.89	.04
Meis	.80	.05
Jeanj	.80	.06
Mos	.70	.07
Pri	.46	.10
Barb	.40	.15
Rol	.10	.25

The second basis on which the tests may be validated,—the foreman's estimate of the workers,—has also very great disadvantages which have been stressed by authors on vocational selection. To mention only one of the obstacles to such comparison: frequent changes among the personnel prevent the foreman from knowing his workers well.

We were fortunate in finding that the managerial staff as well as the operatives had been employed, with very few exceptions, for at least eight years (maximum, 30 years), which enabled the foremen to know their workers very well. This fact partially explains the high correlations between the results of our psychological examination and the supervisors' ratings of their workers.

The two supervisors Barb. and Rol., whose ratings show low correlation with the test scores, are young forewomen, who have supervised their departments for two years only, and do not yet know their workers thoroughly well. Pri., who had been the head of her department for 15 years, had to be relieved of her duties because of inefficiency and assigned to other work. This may explain the low correlation between her estimates and the test scores.

As a whole, our results demonstrate convincingly the high diagnostic value of the tests.

It may be useful to explain our procedures with our five tests. They were given in the following sequence: Disk-setting, cutting, stringing beads, dotting, tapping. Two hundred and thirty women workers were tested. For each test we drew an ogive fre-

quency curve, and determined the percentile score of each worker. As an index of the degree of manual dexterity of each worker, we took the arithmetical average of her percentiles in the five tests. We became convinced that the average of the percentiles in the five tests gave a more accurate picture than any single test. How can this be explained? We hesitate to answer. Is it because the subject is not sufficiently constant in his reactions to give a true picture of himself in a single short examination? Or is it because a series of tests gives a picture of a mosaic of general or special aptitudes, which better distinguishes the personality both as to intelligence and trade dexterity?[2] Whatever the reason, experience repeatedly shows the advantage of using a series of tests, whether for examining general intelligence (see Descoeudres, "Exploration de quelques tests d'intelligence." *Archives de Psychologie*, vol. XI, 1911), or for the diagnosis of motor abilities. The correlations between the forewomen's ratings and the ranks given to the workers by our tests confirm this statement. Table 3 shows that in every department the highest correlation is obtained by taking the arithmetical average of the percentiles of the five tests.

But the diagnostic value of the tests is not confined to classification of the personnel within a plant; it has a much wider significance than is at first apparent. Psychological measurement can guide us throughout. It helps us, first, to compare the general level of dexterity of a plant's employees with that in other factories, even though the output of competitive firms is not known. This is possible if we have not only standards of ability based upon motor tests applied to workers of the company, in other words, tables of norms for our own factory, but also standards established by testing some other similar population. We should be able to compare the motor or intellectual level of our plant with the level of the surrounding population or with a population living under similar conditions. In order to do this, we ought to give our psychological examinations not only to the workers in our factory, but also to a random sampling, a cross-section of the population in a region not far from our plant. The only restriction is, not to mix a town and a country population, nor persons of both sexes, nor children and adults.

TABLE 3

Correlation of scores on separate tests with supervisor's ratings

TESTS	FOREWOMEN						
	Chab.	Hod.	Ross.	Meis.	Jeanm.	Jeanj.	Brod.
1. Disks	.57	.67	.77	.60	.73	.70	.56
2. Cutting	.52	.59	.84	.64	.61	.60	−.24
3. Beads	.87	.49	.57	.51	.64	.43	.37
4. Dotting	.31	.70	.64	.42	.57	.68	.83
5. Tapping	.20	.66	.44	.68	.31	.71	.93
Average percentiles of the 5 tests	.89	.93	.91	.80	.90	.80	1.00

The *Institut J. J. Rousseau*, with the coöperation of the psychological laboratory of the University, has determined such tables of norms for the

[2] W. Stern, *Personnalité et tests*, Journal de Psychologie, Vol. XXV, pp. 5–18.

population of the city of Geneva. They have been published by Mme. H. Antipoff in the *Archives de Psychologie* (Vol. XXI, No. 81, p. 11.). Since the women workers of our factory live in an urban district we thought it permissible to use for comparisons these norms of the *Institut J. J. Rousseau* in our analysis.

Comparison of the norms obtained in our factory with those for the population of Geneva (see table 4), impressed us with the fact that the average dexterity level of our workers was 13.4 per cent lower than that of the adult population of Geneva.

Here again the percentile scores enabled us to trace the reason for the lower dexterity ranking of our workers. To do this we classified our women into three groups, according to age. The first group included workers from 22 to 32 years of age; the second those from 33 to 41; and the third from 42 to 51. For each group and for each one of our five tests we made a Galton ogive or frequency curve and a table of percentiles, which made it possible to compare the various groups. These figures showed that the first group (22 to 32 years) was superior to the two other groups in every test. The superiority of the second group (33 to 41 years) over the third appeared clearly in the disks, beads, and dotting tests, but not in the other two (table 5).

We have thus been convinced that with our workers, age has an unfavorable influence upon success in dexterity tests. More detailed research.[3]

[3] Gertrude Ehinger, *Age and Decline of Aptitudes*. Archives de Psychologie, 1927, Vol. XX, pp. 318-323.

TABLE 4

Comparison of norms for the population of Geneva with those for this factory

PERCENTILES	DISKS (TIME)		CUTTING (SCORE)		BEADS (TIME)		DOTTING (TIME)		TAPPING (SCORE)	
	Geneva	Plant	Geneva	Plant	Geneva	Plant	Geneva	Plant	Geneva	Plant
75	114	113.5	44	33	54	51	55	67	90	70
50	118	120	39	28.5	62	57	63	75	82	58
25	130	128	34	24	66	62	70	84	76	46.5
Comparison of medians.	−2 per cent		−27 per cent		+8 per cent		−16 per cent		−30 per cent	

TABLE 5

Scores for three age groups

(A = 22 to 32 years; B = 33 to 41; C = 42 to 51)

PERCENTILES	DISKS (TIME)			CUTTING (SCORE)			BEADS (TIME)			DOTTING (TIME)			TAPPING (SCORE)		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
25	120	127	131	27	23	24	59	60	68	77	84	91	49	47	43
50	115	120	126	31	27	28	54	54	61	71	76	81	64	58	57
75	110	113	117	34.5	32	33	49	51	55	65	66	72	72	67	70

makes us conclude that motor abilities begin to weaken between the ages of 27 and 33 years. This corresponds with findings of American psychologists in the examination of recruits for the World War (Yerkes, *Psychological Examining in the U. S. Army*, p. 814). We insert here the two figures, the American and our own (figs. 2 and 3).

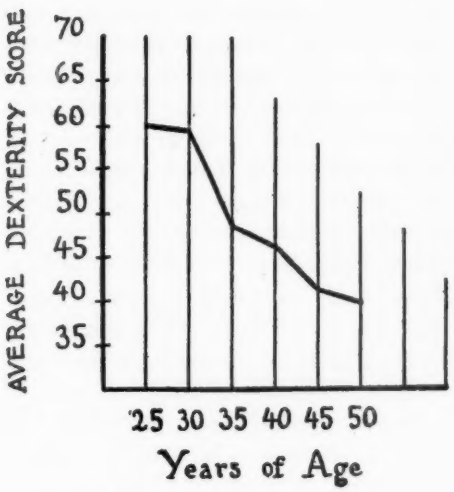

FIG. 2. RELATION OF AGE TO MOTOR DEXTERITY

Average percentiles of the five tests given by the Institut J. J. Rousseau to a sampling of the population of Geneva.

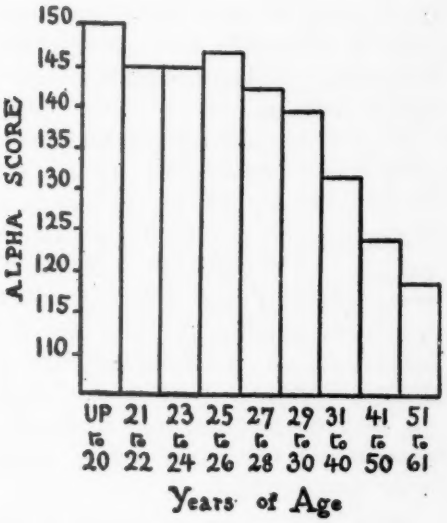

FIG. 3. RELATION OF AGE TO MENTAL ALERTNESS. MEDIAN ALPHA SCORES, REPORTED BY YERKES

In short, the percentile scores have helped us to determine the grade of motor dexterity of the manual workers in our factory, and to find in their age the cause of its inferiority. This discovery has been our guide in our plan of reorganization; to conserve at any cost and to the limit of our knowledge the lessened strength that remained to the older women who constitute such an important part of the personnel of our plant. But, before we describe what we have done, we must stop to consider a question closely related to the previous one: How to set standards of performance for the various jobs in the factory?

VALUE OF TESTS IN STUDYING WORKERS' TASKS

Here again, in studying the workers' tasks, the tests and norms expressed in percentiles will help us.

As is well known, the worker's task is set as the result of a study of the time necessary to complete a given job. Indeed, timing is for many engineers and manufacturers still the only way by which a concern can put its internal organization *en rapport* with the worker.[4] We have demonstrated on a

[4] Léon Walther, *La technopsychologie du travail industriel*, pp. 134–150.

previous occasion how inadequate this method is.

In order to get real assistance from time studies in organizing the workers' tasks, the limits of their applicability must be clearly shown. From the position of first importance assigned to them by Taylor's followers, they must be reduced to a secondary rôle. Within such limits time studies have a double function.

First, in beginning a general survey of work in a department, time studies must be made, not to set standard times, but more specifically, to analyse the jobs and to study the conditions of work. Time studies reveal whether work done in different places with the same tools, etc., results in the same or different output. Time studies show up such inequalities, and incite the experimenter to discover causes. This is the first function.

Next, after the occupational movements of the workers have been submitted to a strict examination in the light of physiological and psychological laws of rhythm, automatism, fatigue, etc., we can undertake the final time study. It will simply be the recording of a completed study. In this rôle it might just as well be replaced by motion pictures. This is the second phase of time study.

In these two functions only will time studies prove helpful in organizing human labor, *i.e.*, in determining the worker's task.

But time studies present another problem, quite as important as the problem of their limitations. This second problem is, "Which worker is to be timed?" While it is agreed that for studying expert motions, timing is to be done on workers whose movements are as nearly perfect as possible, ("classic," to use the French term) opinions differ as to who is to be timed for setting rates. Taylor claims that an excellent worker of first calibre, who works fast, must be chosen as standard. Merrick seems willing to make a concession. The best and the easiest way, he says, is to make observations always on a first class but not extraordinarily skillful worker. Michel agrees with him when he says that there is no reason to take a good worker for time study. Other authors, on the contrary, Fahr for instance, insist that time studies be taken on all workers of the plant, and never on a single one, particularly not on the best one.

But, the notion of an "excellent," or a "well trained," or a "not very well trained" worker is relative. Even the procedure suggested by Fahr, that of classifying the workers of a plant according to their occupational qualifications (index of occupational skill), would have value at most for a single concern. Within the same industry, standards might be higher or lower in two different factories. If Fahr's index of occupational skill is taken as a criterion for a single plant, the goal is missed, because Fahr sets this index according to the piece-rate earnings of the workers, and because the jobs on which these piece-rates have been based are not comparable. The various jobs differ from each other in difficulty. There are, even in a single department, very few operations that are exactly of the same sort. Standard tasks set for various jobs in the same department may be entirely arbitrary. So there is no objective basis for the "in-

dex of occupational skill." We are very far, as is obvious, from the hopes of Taylor and his followers regarding the possibility of fixing "universal" norms for all industries of the same kind.

We believe that the tests, provided they are established on percentile bases, can settle, at least to some extent, the differences of opinion as to which worker should be timed.

First of all, we believe that it is a mere principle of social justice to determine the rates on an *average* worker. But one should have a really objective criterion as to who is the average worker. The tables of percentile norms established on the one hand by use of well proved tests, and on the other hand on a population homogeneous in nationality, location, sex and age, can do this for us. In these tables we shall easily find this *average worker* for whom so many authors have been looking, in order to justify the use of time studies in setting daily tasks or job rates.

Using tables similar to those above mentioned, we studied the duration of each separate job as performed by the worker who had scored closest to the median or fiftieth percentile. We then examined this worker very carefully, as to his material environment, his occupational motions, and his work curve. We did not increase his speed; we merely tried to be sure that his tempo was kept as constant as possible throughout the day's work. We guarded against everything that could disturb his natural rhythm. The time required by such an average worker was then considered as normal time, and his output as a standard task. The workers whose percentiles were above the average could easily exceed the norm thus established, and thus increase their wages. Those in the lower quartiles were assigned as far as possible to other jobs, particularly to time work, to indirect labor, where they could earn if not high, at least reasonable, wages.

The same scores based upon our five motor tests have enabled us to get a picture of the general dexterity level of the various departments. Table 6 gives a general idea of dexterity in all departments included in this psychological survey. One column shows dexterity figures based on the average of the percentiles in the five tests, obtained by the workers in each department. Another column gives the corresponding median.

TABLE 6

Differences between departments

DEPARTMENTS, NAMES OF FOREWOMEN	AVERAGE PERCENTILES, 5 TESTS	MEDIAN PERCENTILES, 5 TESTS
Chab.	61	70
Ross.	55	67
Hod.	65	65
Brod.	66	65
Barb.	61	60
Pri.	49	55
Meis.	41	43
Jeanm.	53	49
Rol.	50	43
Jeanj.	39	40

Table 6 distinguishes the strong from the weak department from the point of view of manual dexterity.

INCREASING EFFICIENCY

Rest periods

Our psychological survey brought home the fact that it was age and not

occupational incapacity which lowered the dexterity level of the personnel of our factory. This situation led us to use all psychological and physiological means which could be of any value for improving the situation.

To determine the best rest intervals for a given job, it is necessary to hold constant every factor of the working conditions except one, the rest periods. These can be varied. Such an experiment may require weeks,

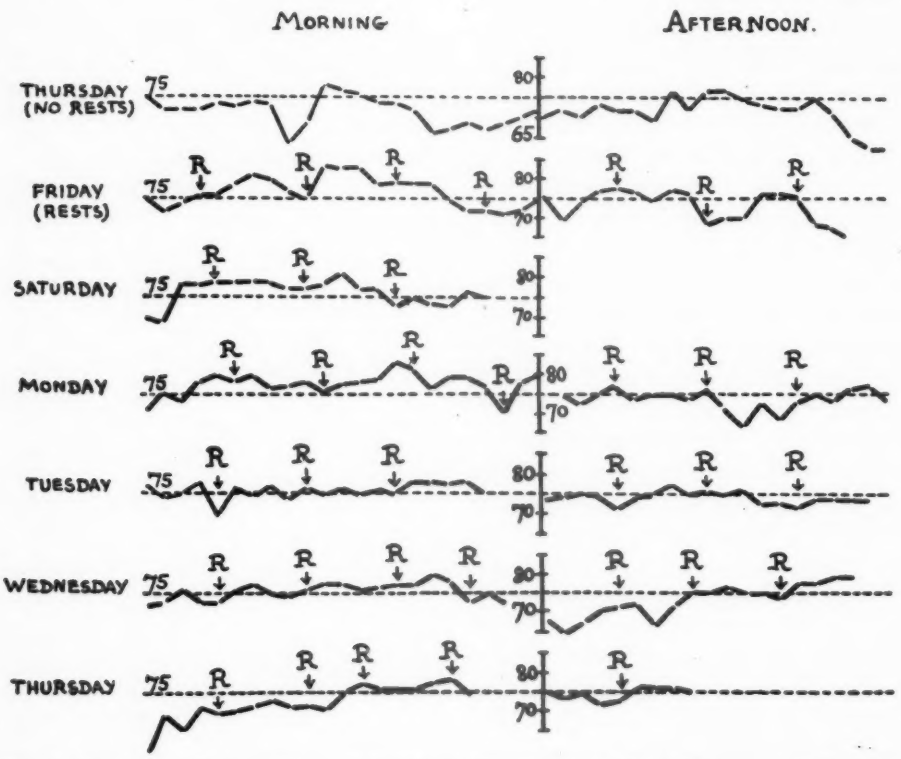

FIG. 4. CURVES OF OUTPUT BEFORE AND AFTER INTRODUCING REST PERIODS. *R* = A FIVE MINUTE REST

To the end of increasing the efficiency of the various departments, we endeavored to remove fatigue in every way possible, to introduce automatisms in the work-processes, and to study in detail the material environment of the workers.

To decrease fatigue, we undertook to introduce rest periods. But at the outset we encountered difficulties which could be overcome only in part. until one succeeds in finding the optimum duration and frequency of the recurring rests.

We chose at random a group of five women workers in a department, to whom we gave a certain wrapping task to do, the same for the entire duration of the experiment. On the first day, we had them work continuously without any stated rest. The operators interrupted their work when-

ever they liked. From the second day on, we introduced a five-minute rest hour, having them work steadily for 55 consecutive minutes. These conditions were kept constant for one week

Figure 4 shows that from the second day on, when a five-minute rest period had been observed, output increased.[5] The first day, the curve of output was below the average of the week; on the following days, it was above the average. This position of the curve was maintained for four days, but then descended to its original level. What was happening?

The workers, who had been accustomed for years to a variety of tasks, changing about every three hours, had the greatest difficulty in adapting themselves to working at the same job continuously for a whole week. There resulted sleeplessness during the night and headaches during the day, until at the end of the week some of the workers were in tears. This lack of variety explains why the curve of output, which had begun to rise in so encouraging a way with the five-minute rest every hour, stopped mounting, and even dropped down again on the last day to its original level.

We had to abandon the study of rest periods in all departments where workers were not used to long, continuous runs. This failure showed us the method to follow: although we knew that continuous work is more satisfactory to study, we had to consider the workers' need for variety. To meet this situation, we divided the work of certain jobs that had been performed by one or two workers only, among five operators. Thus, instead of wrapping and packing the pieces contained in one case of merchandise, a group of five workers packed in the same length of time the contents of five cases, which method did not require replacing the necessary wrapping supplies so often. The packing consisted of various operations. In order to avoid any loss of time from cluttering the table with too much material, resulting from the greater number of workers, we fitted to the table a conveyor belt, upon which the operators placed the wrapped articles. And in order to do away with the distracting effect on the eyes, we covered that part of the moving belt in front of each worker with a bridge on which the products were wrapped. This alteration also made it possible to place the conveyor closer to the operator, to avoid the necessity of stretching out her arm. When one case was filled, the workers changed location and operations, and had thus, as before the reorganization, the benefit of variety. Thus while maintaining the principle of varied jobs for each worker, we were able to turn out in a given time an increased production of the same unit of work as before.

In all departments where a more detailed study could not be undertaken we introduced an arbitrary five-minute pause every hour, but in departments where the workers had been assigned for full time to the same or to very similar jobs, we were able after experimenting to establish the most advantageous rest periods. In one instance they consisted of five minutes

[5] This experiment was made with the cooperation of Dr. R. Meili, director of research at the Institut J. J. Rousseau.

every hour; in another, of five minutes every half-hour.

Continuity of Movements, and Automatism

More extended use of automatized movements was another application of psychology to our reorganization.

We always respected the natural tempo of the average operator, never speeding up her work. In a given time, an operator turns out the same number of pieces now as before our investigation, but she has been given the possibility of keeping at her own natural rate continuously all day long, which she could not do previously. We were able to establish this continuity of work by means of linked movements, which Münsterberg describes in his Psychology and Industrial Efficiency. These result in automatized movements. Chains of automatic motions which are, nevertheless, technically perfect movements, have the advantage of becoming unconscious to the individual, saving every effort of will and of attention, thereby greatly facilitating his work.

THE PROBLEM OF MONOTONY

It might be objected that through mechanization we have added to the monotony of work, yet this reproach does not seem justified. First, monotony is not a feature of the work itself: it is to be attributed to the psychological attitude of the individual. With certain people, standardized repetitive jobs produce a feeling of monotony; that is, a sense of fatigue or weariness, although often there is less feeling of physical tiredness than there is of sheer boredom accompanied by a lessened desire to work; with others, the same operations create either pleasant feelings or indifference. Moreover,the mechanization of the methods of production is an inevitable consequence of the division of labor and of technical progress. It could be stopped only by stopping that very advance. There is no doubt that through the interjection of mechanization between the worker and his work, most workers have lost the immediate satisfaction that comes from self-expression in labor. If we do not wish to underestimate the intelligence of the working class, it seems hard to believe that the present way of working in industry, differing in so many ways from the exercise of the craftsmanship that is disappearing from our industrial world, is for workers a source of mental and moral development. There is nothing more stupefying than the specialized work of our modern industries. The only relief we can offer the worker is to make his work require as little attention as possible, in order to permit the mind to be occupied with other things. The direct stimulus of pleasant work, which is disappearing in the course of evolution in present day industry, ought to be replaced by an indirect stimulus: shorter working hours, with reading and music in the various departments, as far as possible. But, to be able to enjoy such things, the worker's mind must be really freed. This is what the psychology of labor is aiming toward, when making use of sequences of automatized movements, with their beneficial results, so familiar to every one of us in everyday life. Think, for instance, how little attentive thought we need give the daily task of dressing.

TECHNICAL ASPECTS OF WORKING CONDITIONS

The final method used in our work of reorganization was to study the material environment of the worker, with the aim of effecting a better adaptation of machines, tools, and work benches to the psycho-physical constitution of our women workers. We tried always to eliminate unnecessary fatigue, as shown in the following concrete examples.

In one of the departments, the workbenches were provided with a conveyor belt, but curiously enough it was not used continuously. Instead of laying the boxes on the belt as they were filled, the workers kept them until a number of boxes were ready, when they were all placed on the belt at once. So, when the boxes reached the wrapping operators, they had to be taken from the belt all at once and put on the table along side the workers, before being wrapped. Instead of taking the box for immediate wrapping it was first set down and then taken up again. This double handling seemed a waste of motion.

In the attempt to learn why this was done we noticed that in order to take a load from the belt the operator was obliged to bend forward. The table was a little too wide, and the belt too far away. To avoid the fatigue this occasioned, the women preferred to stand up, take a number of boxes from the belt at once, and then lay them down where they could be picked up more easily. The same table was used for two kinds of operations, differing with the weight and size of the product: smaller articles were wrapped while the operators were seated; large paper bags containing several kilograms had to be wrapped while standing. The width of the table was just right for the latter operation.

To adapt the width of these benches to the movements involved in handling the smaller articles, and to avoid fatigue of the muscles of the right arm and shoulder, the benches were narrowed throughout their entire length. The strips cut away were replaced as hinged leaves. Now, when the operators are working seated, the leaves are dropped so that they can sit only 30 cm. away from the belt. This makes it possible for them to take the articles from the conveyor without fatigue.

This change has resulted in more continuous and better balanced work from the point of view of distribution and duration of the operations. A time study of one specific job performed at the belt will serve as an illustration. (See fig. 5).

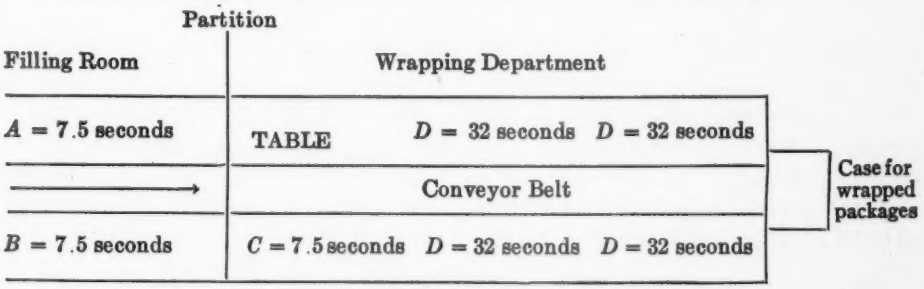

FIG. 5. SHOWING RELATIVE POSITION OF WORKERS AND TIME REQUIRED FOR EACH OF FOUR OPERATIONS

Operation *A*: Automatic filling by machine of a small paper bag.

Operation *B*: Putting filled bag into a tin container.

Operation *C*: Gluing a printed label around the tin.

Let us now examine another specific example taken from a different department.

This was at an automatic wrapping machine. We modified the hand operations connected with the machine work

TABLE 7

Changes introduced in filling boxes of 16 pieces, and in making up packages each containing 12 of these boxes

BEFORE (MACHINE RUN BY 5 OPERATORS)				AFTER (MACHINE RUN BY 4 OPERATORS)	
First operator fed product to wrapping machine				*First operator.* No change	
Second operator fed papers to wrapping machine				*Second operator.* No change	
Third and fourth operators alternately filled box with wrapped product, and closed box				*Third operator* fills box but does not close it	
	Time, in seconds 3d operator		4th operator		*Time, in seconds* 3d operator
Filling box	9	+	9	Filling 2 boxes	18
Closing box	4	+	4		
Waiting	5	+	5		
Total for 2 boxes	18	+	18 = 36	Total	18
Fifth operator made up packages containing 12 of these boxes, and labelled packages				*Fourth operator* closes boxes in addition to work formerly done by fifth operator	
	Time, in seconds				*Time, in seconds*
				Closing 2 boxes	8
1/12 of making 2 packages	7			No change	7
1/12 of gluing 2 labels	1			No change	1
1/12 of pasting 2 labels	1			No change	1
1/12 of stamping 2 packages	0.3			No change	0.3
1/12 of carrying away 2 packages	0.2			No change	0.2
Total time working	9.5			Total time working	17.5
waiting	8.5			waiting	.5
Total	18			Total	18

Operation *D*: Fancy wrapping of the labeled tin. The wrapped container is replaced on the belt, which carries it to the packing case at the end of the bench.

This modification of the installation gave us an efficiency increase of 44 per cent.

according to Münsterberg's principle of linked movements.

At this automatic wrapper, the hand work consists of four operations:

(1) One worker places in line on a steel belt small pieces of the product, to be wrapped automatically by the machine.

(2) A second operator feeds the machine with small printed sheets of paper, for wrapping the article.

(3) Two more operators take turns in (*a*) packing into a small card-board box the automatically wrapped pieces as they come out of the machine on a conveyor; and then (*b*) closing the box.

(4) The final operation consists of wrapping a number of these boxes together into packages, and of labeling the packages. This operation is performed by a fifth worker.

studies for these third and fourth operations before and after the changes were made.

By having the boxes closed by the operator who makes up the packages (fourth operation), instead of by the picking-up and filling operator (third operation), we obtained almost perfectly balanced periods of time, and succeeded in getting linked movements.

As a result of this change, the second picking-up and filling operator was eliminated, the machine was run by

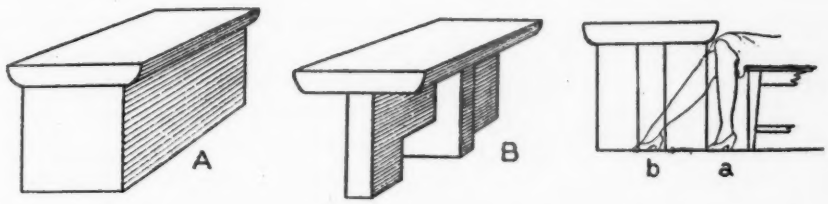

FIG. 6. *A* = DIAGRAM SHOWING OLD ARRANGEMENT; *B* = DIAGRAM SHOWING NEW ARRANGEMENT; *a* = POSITION OF LEGS BEFORE CHANGE; *b* = POSITION OF LEGS AFTER CHANGE

In observing how the third operation was accomplished, we noticed that the two workers were continually getting in each other's way as they alternately turned to pick up the pieces wrapped by the machine. Moreover, the time required for packing the pieces into the box was not the same as the time necessary for closing the box. Therefore no continuous rhythm could be established in the work. It could not be automatized because the movements were not linked. This unevenness caused a nervous strain and tired the operators. Furthermore, the last worker of the group, wrapping the boxes into packages, was not kept busy all the time. Table 7 gives the time

four operators instead of five as before, and the efficiency increased 20 per cent.

A final example will show to what extent a physiological study of the material equipment can help to reduce fatigue.

There is another machine, of which fig. 6*A* represents only the outline, which has long been in use in the particular line of industry we are studying. In observing how the work was being done at this machine, we noticed the abnormal position in which the operators had to hold their legs. We asked the engineer of the concern to make an effort to change the machine so that the legs could be in a more normal

position. He found a solution that allowed the workers to sit more comfortably at their work. This is an example of the coöperation that can and ought to exist between psychologist and mechanical engineer. Formerly the operators produced two trays of small pieces of the product, after which they had to rise and carry the trays to the next department. Due to the abnormal position of the feet, this interruption in the work was a physiological necessity, in order to keep working all day. If this interruption had not existed, the workers would have invented it. As a result of this change in design, it was possible to place the machines next to the wall which separated the producing and packing departments. The workers then were able without rising from their seats to hand the finished product to the next department through openings made in the wall for the purpose. Only after this change were the workers able to remain seated at their machines, rising only once an hour for a rest period of five minutes.

In order to automatize the manufacture of the product, that is, in order to have the work done without thought on the part of the operators and without interfering with the perfect quality of production, we have determined and prescribed the exact amount of each variety of the product that is to be laid on the tray. A worker obviously loses time in trying to crowd into an almost filled tray one last piece for which there is not quite enough room. If therefore there is a regulation as to the number and arrangement of pieces to be placed on the tray, the work becomes regular and can be made automatic.

The changes we introduced at these machines resulted in a 30 to 40 per cent increase of output, without accelerating the tempo in the least.

RÔLE OF THE TECHNOPSYCHOLOGIST

These few examples taken from our numerous experiments in this factory illustrate the usefulness of industrial psychology. Without encroaching upon the domain of the mechanical engineer, and without any previous initiation into the technical side of the particular industry involved, the psychologist is able to improve the working conditions of a plant, to the extent that the psychology or physiology of the workers contribute to the problems of work. The psychologist does not make the work of the engineer superfluous any more than the latter replaces the psychologist; but their relationship is very close.

The entry of the psychologist into the factory represents an infinitely small part of the management of the great industrial machine; but his is no less important than any other function in industry, as our short study suggests. It is this thought which decided us to communicate the results of our investigations to others interested in applications of psychology to practical affairs.

(*Manuscript received September 1, 1928.*)

Tests for Garment Machine Operators[1]

By Katharine Treat, *Vocational Adjustment Bureau,*[2] *New York*

Ability to learn to operate a power machine is a minimum requirement for some of the least exacting employments in the garment industry. The Vocational Adjustment Bureau has made a definite contribution to the problem of how to decide, in advance of training, whether a girl probably has this ability.

This article describes the method and gives the results of an attempt to measure by a series of psychological tests the aptitude of subnormal girls for power machine operating in the garment trades, and thereby to predict probable successes and failures. The tests were standardized on a group of girls from the New York City elementary schools. Every girl had an Intelligence Quotient of .70 or below on the Terman Revision of the Binet-Simon scale. Each girl was given 90 hours trial on the machines. A team of five tests showed a positive correlation of .66±.04 with the ability to learn operating, and would have eliminated 76 per cent of the failures if given in place of actual trial on the machines. There are other factors eliminating failures for this group, such as emotional instability and a mental age below eight years.

THE purpose of this experiment was to see if the aptitude of subnormal girls for power machine operating could be measured by a series of tests. A number of psychological tests were given to a group of subnormal girls upon entering a trial class organized for the purpose of determining how many girls of this type could learn to do such work. "To learn" was defined,—to learn to operate the power machine and to

[1] This experiment would have been impossible without the complete coöperation and invaluable help of Mrs. Edna W. Unger, Director of Industrial Experiments for the Vocational Adjustment Bureau, and Director of the experiment in connection with which these tests were devised; Dr. Emily T. Burr, Director of the Vocational Adjustment Bureau; Miss Mary McCrystall, Instructor of the machine operating classes; and Dr. Arthur Frank Payne, who read the manuscript and helped with the organization of the material.

[2] The Vocational Adjustment Bureau is a social service organization, specializing in the study of problem girls, particularly in relation to vocational guidance and employment. The maladjustments of these girls often are due to subnormal mentality or psychopathic tendencies which may result in social and industrial inadequacy. By taking into account the entire situation surrounding the girls, and by studies of the Research Department, an effort is made to place each girl where she may develop to the limit of her capacity. The Bureau maintains an experimental therapeutic workshop, to which nervous and mentally disturbed girls are sent for economic rehabilitation.

produce work which should reach or exceed the average standard set by the machine operating industries. If significant relationships were found, the tests could be given in place of actual tryout on the machines, to separate probable successes from probable failures among future applicants for such trade training.

Devising the tests was part of a larger experiment[3] the purpose of which was to find out by actual trial on the machine, (1) whether girls of subnormal mentality are capable of learning how to run an electric sewing machine sufficiently well to be recommended for a job in the machine operating industries; (2) if so, what factors contribute to their success; and, (3) how these factors can be measured.

As far as possible the atmosphere of the shop rather than the classroom was maintained, and trade standards were adhered to as closely as possible in every phase of the work. The class was defined, however, purely as a testing class with no attempt to train for the trade.

The experiment was carried out at the workrooms of the Emanuel Sisterhood of Personal Service, 318 East 82nd Street, New York.

DESCRIPTION OF GROUP

One hundred seventy girls had passed through the classes from July 1923 to the first part of March 1925, but there were complete records for only 101 girls. Of the total number, 148 were sent by the public schools, (54 per cent either were in the ungraded classes or had previously attended such classes), and 22 by the Vocational Adjustment Bureau.

The tests were devised and standardized on the first 45 girls,[4] and a team of tests constructed and given to 56 girls who entered subsequently, making 101 girls in the total experimental group.

Chronological age. The girls in these classes were quite young, ranging in age from 12 years and 4 months to 16 years and 4 months, with two girls at 19 years. The average was 15 years and 3 months with 80 per cent of the girls between 14 and 16 years of age. This was approximately the age at which such girls usually enter industry.

Mental Type. Only girls subnormal in general intelligence were admitted to the class. It was decided to consider girls subnormal whose intelligence quotient was below .70 as obtained by the Terman Revision of the Binet-Simon Test. In figuring the intelligence quotient, 16 years was considered the maximum chronological age.

The girls ranged in mental age from 5 years and 10 months to 11 years and 2 months (the mental age of an individual 16 years of age whose intelligence quotient is .70). The aver-

[3] For a complete description of these classes see: Edna W. Unger, *Vocational Training for Subnormal Girls, An Experiment in the Garment Machine Operating Trade.* Journal of Personnel Research, October, 1926, pp. 243–255.

[4] For a complete report of this experiment on the preliminary group of 45 girls see: Katharine Treat, *A Team of Psychological Tests for Mentally Deficient Power Machine Operators.* Unpublished thesis, Columbia University, October, 1924.

age mental age was approximately 8 years and 11 months with two-thirds of the group between between 7 years and 9 months and 10 years and 1 month.

The range in intelligence quotients was from .40 to .70. The average I.Q. was .58, with two-thirds of the group between .53 and .64.

Although chronologically and mentally a fairly homogeneous group, the class was otherwise unselected and probably represented as varied types as possible within these limits. As a whole the group was fairly stable. Eleven girls showed neurotic tendencies that were likely to cause future difficulty in industrial adjustment.

STANDARDS AND MEASUREMENTS OF ACCOMPLISHMENT

The criterion with which each test was compared for the *first group of 45 girls* on which the original battery of tests was standardized, was a single mark made up from an average of the actual marks given for work in machine operating day by day. A five-point scale was used: poor, poor-plus, fair, fair-plus, and good. All work was rated on six points,—accuracy, speed, neatness, handling, grasp of directions, and attitude. In the final mark, the two items of accuracy and speed were weighted by giving each twice the value of the other items. The final weighting was obtained by adding the weighted score and dividing by 8. This was an objective work rating.

For the *whole group of 101 girls*, however, there was added to this objective work rating a subjective rating. Thus the absence of the incentive of remuneration, competition, pressure, strain, etc., was taken into account by the instructor in judging the chance of success of each individual as a future operator. Some who rated well in actual accomplishment had to be rated subjectively as possible failures in industry for such reasons as nervousness, inability to concentrate, quarrelsomeness, need of constant prodding, etc., while others who rated slightly below average on the basis of actual accomplishment, were considered possible successes for such reasons as personality, failure to put forth full effort because of lack of financial compensation, etc. The correlation between the objective work rating and the subjective rating was .87 $\pm$.02,—almost high enough to warrant their being used interchangeably. Since the purpose of this experiment was not only to measure the trainability of the subnormal girl as a machine operator, but also to estimate her probable success as an operator in industry, it was decided to use the second or subjective *judgment rating* as the criterion for the group of 101 girls, after approximately 90 hours of training in operating.

Twenty-one girls or 21 per cent were probable successes, 21 or 21 per cent were doubtful successes, and 59 or 58 per cent were probable failures.

TEAM OF TESTS CHOSEN

The conditions for testing were very good. The individual tests were given in a separate room, and for the group tests the girls used their machine desks. All the tests could not be given before the class started to work, so the testing was extended over the six-weeks period for each group.

Ratings by instructor

All but six of the girls were still in school and took the testing as a matter of course. In case of nervousness or disinclination to take the tests, those tests requiring fore-exercises were given first, or some preliminary puzzles were used as "shock absorbers," or the testing was postponed.

A preliminary battery of 18 tests was used with the first 45 girls in the class. The tests are for the most part widely known, so no detailed description of them is given. The following is a classified list of the tests used:

Intelligence Tests
- Stanford-Binet
- ✓Porteus Maze

Directions Test
- Easy Directions Test (arranged by Woodworth and Wells)

Association Test
- Substitution Test (Woodworth and Wells)

Cancellation Test
- Number Cancellation (Woodworth and Wells)

Form Board Tests
- Mare and Foal (Pintner and Paterson)
- Casuist Form Board (Pintner and Paterson)
- Healy Puzzle A

Tests for Motor Abilities
- ✓Trimming Test (Institute of Educational Research, Girls' Mechanical Assembly Tests)
- ✓Paper Folding Test (Glenn)
- Motor Control (Burr)
- Zigzag Test (Mead)
- ✓Card Sorting Test
- ✓Dexterity Test (Scott)
- Steadiness Test

Special Tests
- Stenquist Mechanical Assembly Test
- Vision Test (Snellin Eye Chart)

Those five tests which showed the highest correlation with the objective work rating were chosen for the team of tests. They were the following five tests which were used as a team of tests for the entire group of 101 machine operators.

Trimming Test.[5] This is Test 11 of the Girls' Mechanical Assembly Tests, Institute of Educational Research, and was given as a group test to small groups. It involves cutting out a design between a path of double lines, the path becoming narrower as it progresses. The excellence of the performance depends upon ability to avoid touching the lines.

Porteus Maze Test.[6] There are eleven mazes on a scale of increasing difficulty designated by ages, from the third to the fourteenth year. The test age score of the subject is expressed in terms of mental age.

Paper Folding Test.[7] This is a simple test consisting of folding five 4x4 sheets of yellow paper into smaller pieces in a designated way. The subject is told to fold, as quickly and neatly as possible, her five sheets one after the other in just the way the examiner illustrates. The papers are scored for time and quality, but only the quality score is considered. The subjects are hurried in order to see

[5] Herbert A. Toops. *Tests for Vocational Guidance of Children Thirteen to Sixteen.* Teachers College, Columbia University, Contributions to Education, 1923, No. 136, pp. 123–125.

[6] S. D. Porteus. *Porteus Tests.* The Vineland Publications of the Training School at Vineland, N. J., September, 1919, No. 16.

[7] Irene Glenn. *A Report on the Correlation of Mental Tests with Academic and Manual Subjects.* Journal of Educational Psychology, vol. 3, p. 496.

the quality of work they could do under pressure. It is a simple test to comprehend, and after the first paper is folded becomes a test of manual dexterity requiring precision, neatness, and speed, rather than comprehension.

Card Sorting Test. This test consists in arranging according to suits two packs of playing cards with four cards removed to make an even hundred cards. The cards were always presented to the subject in the same order and she was told to arrange them into the four suits which had previously been pointed out to her.

Scott Three-hole Dexterity Test.[8] The apparatus for this test consists of a block of wood about five inches by eight inches, in which there are holes arranged to make an equilateral triangle. The holes are metal. Behind each hole is a small metal counter. The board is supported to stand at an angle of 45 degrees. There is a metal stylus with a wooden handle. The subject is told to take the stylus and insert it into the holes in rotation as quickly as possible. A trial practice period of 15 seconds with each hand is given. Then the total number of taps made by the right hand and registered by the counter on the back of the board in 30 seconds is averaged with the total number made by the left hand in 30 seconds. This is the score.

METHOD OF HANDLING DATA

The scores for the various tests for the preliminary group of 45 girls had to be made comparable before adding. This was done by giving the respective series of scores the same degree of dispersion, and then, by a formula, converting each score on each test into the new series.[9] These new scores for each girl for each test were added together and the result was the girl's total team score. The formula for converting these scores was worked out and standardized on the preliminary group of 45 girls, and then applied to the total group of 101 girls of which these 45 were a part.

The criterion correlations for the preliminary group of 45 were found by the Spearman Rank Order Method. The coefficients of correlation obtained in each case were transmuted to the equivalent of the Pearson coefficient of correlation.

For the total group of 101 the correlations with the criterion were computed by the Toops' revision of the Pearson correlation formula. Toops' multiple ratio correlation formula was applied to these raw correlation coefficients, on both the raw scores and the team scores, to select the team or battery of tests which would yield the maximum prediction of the criterion.[10]

CORRELATIONS

The correlations for the preliminary group of 45 girls between their rank in machine operating and the rank in

[8] Walter Dill Scott. *Personnel Management.* A. W. Shaw Co., Chicago, 1923.

[9] Clark Hull. *The Conversion of Test Series into Series which Shall Have any Assigned Degree of Dispersion.* Journal of Applied Psychology, vol. 6, pp. 288–300.

[10] The statistical work for the total group was done by Mrs. Zaida Miner, Statistician, Teachers College, Columbia University.

each of the several tests varied all the way from +.69 to −.49. The tests chosen for the team were those five tests whose coefficients of correlation were of the greatest magnitude, and which were also practical and quick to administer. The five tests in the team can be given in the comparatively short time of 30 minutes. This includes explanations, actual time consumed by the tests, and computation of the total score.

Table 1 shows the coefficients of correlation for the five team tests with the criterion for the group of 45 girls.

TABLE 1

Showing coefficients of correlation of tests with criterion for 45 subjects

NAME OF TEST	COEFFICIENT OF CORRELATION	PROBABLE ERROR
Trimming	.69	±.05
Porteus Maze	.65	±.06
Paper Folding	.63	±.06
Card Sorting	.60	±.07
Scott Dexterity	.54	±.07

The sum of the scores in these five tests correlated .84 ±.029 with the criterion. The correlation of the added scores for the five tests is thus considerably higher than that for any single test. A single test is limited in scope and measures only a few of the factors required by the operation. By combining several kinds of tests, all of whose coefficients of correlation are high and positive, one test compensates for and adds to another, giving a more reliable picture of the "general ability." Because of the statistical method used there is no way of telling what any single test is contributing, but it did not seem worth while to use the multiple correlation method when there were only 45 cases to consider.

Although the correlations are high and positive for the total group, they are considerably lower than those obtained on the preliminary group. A larger sampling of girls was used, however, and a more reliable method of statistical analysis. The results are therefore more indicative of the real situation.

TABLE 2

Showing coefficients of correlation of tests with criterion and with each other for total group of 101 girls

	CRITERION	PORTEUS MAZE	TRIMMING	PAPER FOLDING	CARD SORTING	SCOTT DEXTERITY
Criterion		.58	.52	.52	.35	.21
Porteus Maze	.58		.48	.58	.45	.15
Trimming	.53	.48		.56	.39	.21
Paper Folding	.52	.58	.56		.42	.12
Card Sorting	.35	.45	.39	.42		.24
Scott Dexterity	.21	.15	.21	.12	.24	

Table 2 shows the correlations with the criterion and the intercorrelations between the five team tests. It is interesting to note that there is a change in the rank order of the magnitude of the coefficients of correlation from that of the preliminary group where the *Trimming Test* instead of *Porteus Maze* showed the highest correlation with the criterion.

The total scores on the team tests show a positive coefficient of .66 ±.04[11]

[11] In Mrs. Unger's report, *Vocational Training for Subnormal Girls*, Journal of Personnel Research, October, 1926, page

with the criterion for the total group. Although this correlation is sufficiently high to suggest the value of the tests, it is considerably lower than the correlation of .84 ±.029 on the preliminary group.

CRITICAL SCORE METHOD

When the final test scores for the preliminary group of 45 are plotted on a scatter diagram with the criterion scores, that is, scores in operating, it is apparent that 250, the median score, is the dividing line for weeding-out purposes. All of the probable successes in operating score above this point, and all but two of the doubtful successes. It eliminates 19 out of 24 failures or approximately 80 per cent. The scores of the five failures included are 262, 261, 255, 253, and 252. Their ranking respectively in the group of 24 failures is 4, 3, 12, 16, and 1. Thus three of these subjects considered failures are more or less on the borderline of doubtful successes when their rank order in the group is considered. Lack of ability to concentrate and lack of interest seemed to be the cause of failure for the other two girls, rather than lack of ability to do this kind of work. Thus we may call the total team score of 250 the *critical score.*

A critical score chart plotted for each test separately with the criterion shows any single test to be practically valueless in eliminating failures.

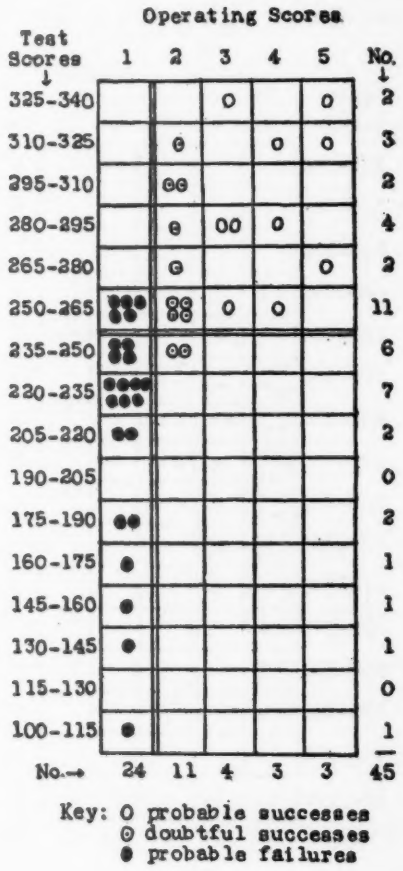

FIG. 1. CRITERION SCORES AND FINAL TEST SCORES PLOTTED TO SHOW CRITICAL SCORE FOR PRELIMINARY GROUP OF 45 GIRLS

Figure 1 shows graphically the value of the critical score method when the criterion scores are plotted against the final test scores.

When the final test scores for the total group are plotted with the criterion or judgment rating, it is appar-

252, the correlation of the total team scores with the criterion is given as .59 ±.05, whereas it is given in this article as .66 ±.04. The original multiple of total scores was computed on the basis of total scores obtained by combining tests according to the original weights used, and the latter multiple by combining the single tests and building up the correlation the .07 points.

ent as with the preliminary group that 250 is the critical score. If, therefore, a preliminary selection on the basis of the total score made on the team of tests with a critical score of

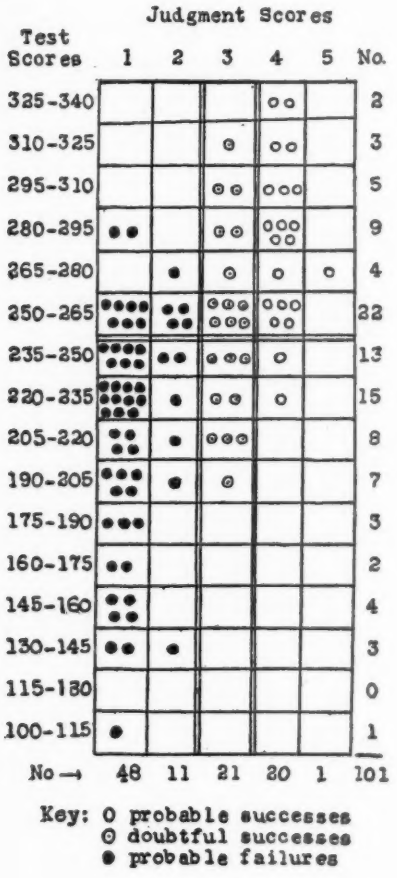

FIG. 2. CRITERION SCORES AND FINAL TEST SCORES PLOTTED TO SHOW CRITICAL SCORE FOR TOTAL GROUP OF 101 GIRLS

250 is made, 45 out of 59, or approximately 76 per cent of the failures, are excluded. Only 9 doubtful successes and two probable successes are eliminated. One of these successes was very immature and the other had an I.Q. of .49 with a mental age of 7.8 years. There are still 14 or 24 per cent who failed, not eliminated by a critical score of 250. These failed, therefore, not from lack of specific motor abilities measured by the tests and presumably required by machine operating, but because of the absence of certain other necessary qualities, possibly those classifiable under the head of "personality."

Figure 2 shows graphically the value of the critical score method when the criterion scores are plotted against the final test scores for this group of 101.

To the knowledge of the writer, no short method of evaluating elements of personality has been satisfactorily derived nor any test or chart method which would show even in small measure the traits revealed through contact with the individual during such a test period as that in the machine operating class.

A glance at the records of the 14 girls who, while above the average in total team score, and thus apparently possessed of those specific motor abilities demonstrated by the tests, were failures in the machine test, shows that five were considered as decidedly institutional cases,—so hopeless was the prognosis for success at even the lowest grade unskilled work; three were emotionally unstable; and nine seemed incapable of that concentration and application that would have turned to account such operating ability as they did possess. In one case the work seemed physically a little too strenuous.

OTHER ELIMINATING FACTORS

In considering other possibilities besides the team of tests in eliminating failures, none was found to be so valuable.

Chronological Age. For this narrow range there seems to be little relationship between chronological age and ability to run an electric power machine. There is a positive correlation of only .016±.07 between these two factors.

Mental Age. There is considerably more relationship between mental age and the ability to run an electric power machine than there is between chronological age and this ability. The correlation is .36±.07. This relationship, however, is not particularly significant, except that below the eight-year mental level there were only two probable successes. Above that there is a slightly increasing percentage of successes for increasing mental age. A preliminary weeding out of possible future failures with eight years mental age as a critical score will eliminate approximately 33 per cent of the failures.

In comparing the failures eliminated by the tests with those eliminated by a mental age of eight years, it is evident that the total team score of 250 is the more valuable. By a preliminary elimination of failures with a mental age under eight years, 40 out of the total number of 59 failures were not eliminated, whereas only 14 failures were not eliminated by the team score of 250.

Only one failure with a mental age under eight years made a team score of over 250; 67 per cent of the failures with a mental age over eight years made a team score under 250; 13 of the 14 failures not eliminated by the team score had a mental age over eight years and thus were not eliminated by either score; one failure was eliminated by mental age who was not eliminated by the team score, (it is always possible that the result of the mental test given was inaccurate);

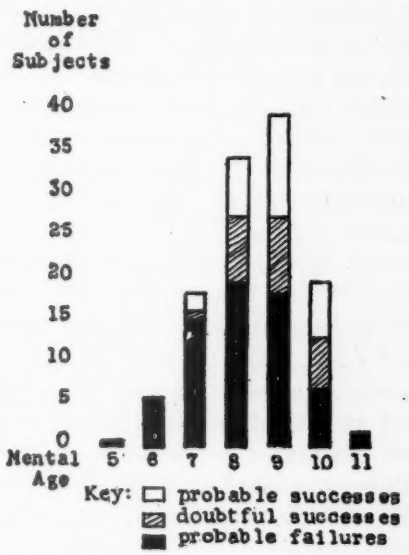

FIG. 3. SHOWING NUMBER OF SUCCESSES, DOUBTFULS, AND FAILURES AT EACH MENTAL AGE

and the team score eliminated 27 failures not eliminated by mental age.

Figure 3 shows the number of probable successes, doubtful successes, and probable failures at each mental age. At the seven-year level 13 per cent were probable successes, at the eight-year level 21 per cent, at the nine-year level 31 per cent, at the ten-year level 38 per cent, and at the eleven-year level there were no successes.

Intelligence Quotient. The intelligence quotient as a factor in eliminating failures gives practically the same results as the mental age factor. Between the I.Q. and the criterion there is a positive correlation of .35±.05. A preliminary weeding out, with a critical score of I.Q. .50, will eliminate 24 per cent of the probable failures. A comparison between the preliminary elimination of failures with a critical score of I.Q. equal to .50 and a critical team score of 250 reveals that the total team score is more valuable. Twenty-six out of 59 failures or 44 per cent were not eliminated by an I.Q. of .50. No failure with an I.Q. under .50 succeeded in making a team score over 250. Of the failures with I.Q. over .50, 68 per cent made total team scores under 250. The 14 failures not eliminated by a team score of below 250 had an I.Q. over .50 and thus were not eliminated by either score. No failure was eliminated by an I.Q. of .50 who was not eliminated by the team score. The total team score eliminated 30 failures not eliminated by the I.Q.

CONCLUSIONS AND RECOMMENDATIONS

The team of psychological tests do discriminate between probable successes and probable failures.

The critical score method is probably the most practical and useful method for weeding out probable failures.

If training in power machine operating for girls subnormal in general intelligence should be continued by the Vocational Adjustment Bureau or any other agency, no girl should be admitted to the class unless she has a mental age over eight years as measured by the Terman Revision of the Binet-Simon Test for General Intelligence, is emotionally stable, and achieves a score of 250 or more on the team of psychological tests described in this report.

From the results of this experiment there is no reason to believe that these tests would be valid for any other group of girls learning machine operating unless the same requirements for entrance to the class were imposed, and a similar course of training was given. The three or possibly four most valid tests, however, should be tried out on similar groups so that they may be further standardized, and then with groups perhaps slightly higher mentally and chronologically to see whether the tests can be used for selective purposes for such higher groups.

(*Manuscript received November 15, 1927.*)

Intelligence of Young Printers

By Don H. Taylor, *New York University*

The coöperation between trade-unions, employing printers and continuation schools in the training of apprentices, which has long been effective in New York City, provided a setting for this study of the distribution of intelligence among future compositors and pressmen of the industry. Dr. Taylor is Assistant Director of the National Junior Personnel Service, Inc.

The National Junior Personnel Service, in a recent survey of the adjustment problems of employed youth in Greater New York, had occasion to give the Otis Advanced Examination to several occupational groups, including more than 1200 young printers. Composing room workers seemed unselected on the basis of the ability measured by the test. Pressroom workers, on the other hand, showed a marked inferiority in the ability measured by the test. There was some evidence that this difference might be due to experience requirements rather than to job requirements. The results seemed sufficiently significant to warrant a more elaborate effort to determine the characteristics of successful workers in the trade. Such a study is in progress.

A STUDY of adjustment problems of employed youth made by the National Junior Personnel Service in 1927 afforded an opportunity to give intelligence tests to a large group of young printers in New York City who were either apprenticed as compositors or pressmen in union print shops, or were employed in printing establishments and looking forward to such apprenticeship.

Union regulations in New York City require that pressmen's and composirors' apprentices in union shops attend once a week schools organized for their crafts. All the young men enrolled in apprentice schools at the time of the study were tested; and as approximately 30 per cent of the printing establishments of the city were then operating in compliance with union requirements it may be assumed that those tested were representative of the young men in the industry in New York.[1] Tests were also given to a pre-apprentice group composed of fifteen- and sixteen-year-old boys who were attending the Central Printing Trades Continuation School for four hours each week. These boys had been admitted to this school because they were employed in the trade; had

[1] New York City produces more than one-fifth of the printing of the United States, employing approximately 37,000 wage-earners in various branches of the industry. It is the greatest center of printing in the country.

signified their intention of remaining in it; and, theoretically at least, had been certified by printing instructors in unspecialized continuation schools as having aptitude for the work. It is probable that many of the future apprentices in the industry will be selected from the students of this school.

Group tests of intelligence are notoriously unreliable as a method of exact diagnosis of an individual, but they do afford a convenient and valuable method for group comparisons. Likewise, though intelligence as measured by tests has been shown elsewhere[2] to be an important factor in scholastic success, less conclusive results have been obtained from studies of its importance for vocational success. It was hoped, therefore, that this very complete intelligence survey of young men in the printing industry in one city might throw some light on the question as to whether or not intelligence test results are of value for guidance into or selection for the two chief crafts in the industry.

TEST AND STATISTICAL MEASURES USED

The Otis Advanced Examination, Form A, was the test selected for the survey. Several group tests of intelligence are available which correlate highly with each other. Experimentation led to the conclusion that the test selected was as reliable and valid as any and for the group to be studied, probably the most desirable.[3]

Scores obtained by the Otis Examination can be translated into an *IB* or index of brightness. The *IB* representing exact normality for any age is 100. The *IB* for any individual is found by adding to 100 his Increment of Score above the normal score for his age or by subtracting from 100 his

TABLE 1

Young printers ranked according to index of brightness

IB	PRE-APPRENTICES	APPRENTICES		Total
		Compositor's	Pressmen's*	
170–179	1	1	0	2
160–169	3	3	0	6
150–159	7	11	0	18
140–149	11	17	3	31
130–139	30	22	7	59
120–129	41	34	22	97
110–119	46	36	15	97
100–109	56	64	11	131
90–99	56	63	28	147
80–89	59	54	19	132
70–79	60	55	27	142
60–69	33	45	29	107
50–59	26	29	26	81
40–49	14	21	35	70
30–39	11	10	24	45
20–29	5	3	21	29
10–19	5	6	14	25
1–9	2	1	14	17
Total.....	466	475	295	1,236

* This group includes 156 newspaper pressmen's apprentices and 139 job and cylinder pressmen's apprentices. Results for the two groups were so nearly identical that it seemed wise to combine them into a single group for the purposes of this discussion.

[2] See particularly, W. M. Proctor, *Psychological Tests and Guidance of High School Pupils.* (Revised.)

L. T. Hopkins, *The Intelligence of Continuation-School Children in Massachusetts.*

[3] Detailed discussions of the validity of the scale are found in Arthur S. Otis, *An Absolute Point Scale for the Measurement of Intelligence,* Journal of Educational Psychology, May and June, 1918.

Lewis M. Terman, *The Measurement of Intelligence.*

Decrement of Score below the normal score for his age. The normal is the median score of unselected groups. The *IB* in turn may be translated into percentile rank. The percentile rank of an individual is the percentage of individuals of his age whom he exceeds in mental ability (as measured by the test). The normal or median percentile rank for any age, of course, is 50. The achievement of different age groups can thus be compared in terms in either *IB* or percentile rank. Both measures have been used in the interpretation of results.

Table 1 indicates the distribution of test scores for the three groups of young printers expressed in terms of *IB*.

A graphic representation of these results is shown in figure 1. The most obvious disclosures are first, the similarity of the curves for the continuation school group and the compositors' apprentices, and the approximation of both curves to the normal curve; and second, the extreme positive skewness of the curve for pressmen's apprentices.

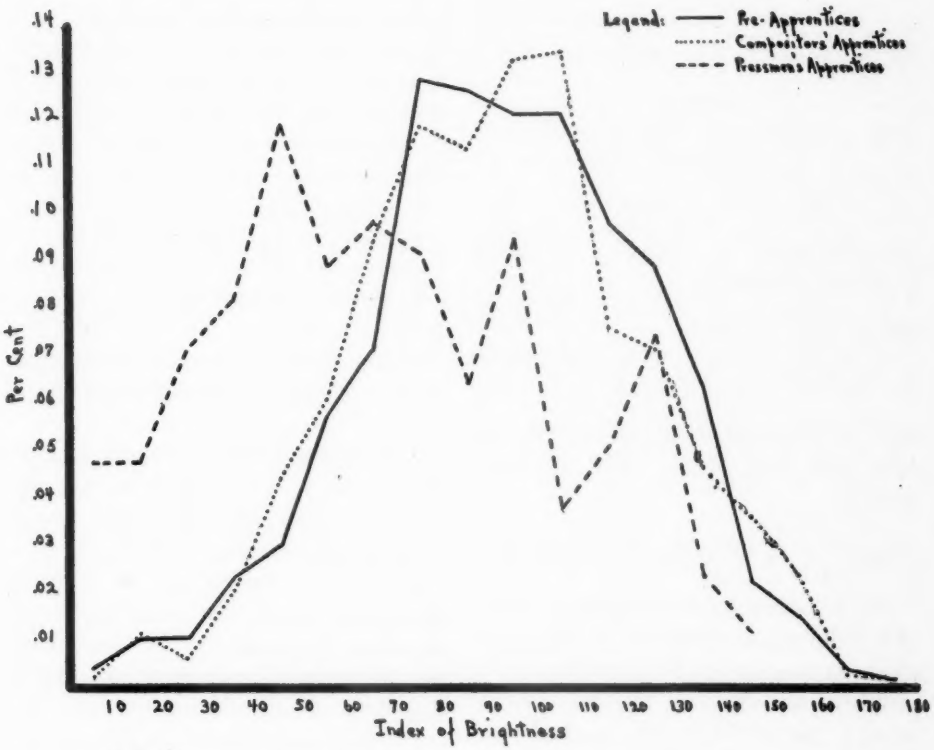

FIG. 1. DISTRIBUTION OF GROUPS ACCORDING TO INDEX-OF-BRIGHTNESS

Group comparisons of means and standard deviations of the frequency distributions of *IB*'s is given in table 2.

The similarity of results for the printing continuation school and the

compositors' apprentice school is again indicated by this table as is the much lower rating of the pressmen's apprentice group. Statistically studied these differences are found to be even more significant. When comparing independent groups the usual way to test whether or not differences noted are due to chance is to compute the Probable Error of the difference using

TABLE 2

Means, probable errors, and standard deviations of table 1 by groups

GROUPS	MEAN	*P.E.*	*S.D.*
Pre-apprentices.....	92.98	.948	30.35
Compositors' apprentice school.....	91.80	.952	30.74
Pressmen's apprentice school.....	67.27	1.408	35.84

one of the statistical measures,—in this case the Mean. The formula used is

$$P.E._{M_1 - M_2} = \sqrt{(P.E._{M_1})^2 + (P.E._{M_2})^2}$$

To be considered completely reliable a difference should be at least four times as large as its Probable Error.

When the means for the three groups (table 2) are thus studied two facts stand out:

1. The difference between the means of the continuation school group and the compositors' apprentice group, 1.18, is not statistically significant since the Probable Error of this difference is 1.345; that is, it is larger than the actual difference itself.

2. The differences between the mean of the pressmen's apprentice group and the mean of each of the other two groups are startlingly significant. Compared to the compositors' apprentice group the difference in means is 24.53, approximately fifteen times the Probable Error of the difference which is 1.70. Compared to the continuation school group, the difference in means is 25.71, again approximately fifteen times 1.697 which is the Probable Error of this difference.

The possibility that this difference of means is influenced by the wider range in case of the continuation school and compositors' apprentices distribution is dispelled by a comparison of the medians for the three groups:

Pre-apprentices: median *IB*.....	93.11
Compositors' apprentices: median *IB*.....	92.14
Pressmen's apprentices: median *IB*.....	64.66

The difference of medians is thus even greater than the difference of the means.

It is doubtful if conditions at time of taking the test or attitude toward the test materially affected results.[4] Apprentice groups maintained good order during the testing and so far as could be judged seemed genuinely interested in doing their best. The rooms were not overcrowded and there was almost complete absence from outside distractions. Any handicap due to environmental conditions or attitude would have been felt most severely in the case of the continuation school group. Some of the class rooms were very crowded at the time the tests were given; there was the occasional possible distraction due to the noise of presses operating in the next room;

[4] The testing was done by J. V. Hanna, Instructor in Psychology, Washington Square College, and the writer, both of whom are members of the research staff of the National Junior Personnel Service.

and, being younger, there was more of a tendency towards restlessness and fooling during the testing period.

FACTORS AFFECTING TEST SCORES

Undoubtedly after a certain point age affects the mental test achievement of hand workers. It is reasonable to suppose that, other things being equal, the longer the time a manual worker has been out of school the less successfully he will respond to paper and pencil exercises such as those required by the Otis examination. Since the median age for the pre-apprentice group was sixteen years; for the compositors' apprentices twenty-one years; and for the pressmen's apprentices, twenty-seven years, the last group was perhaps at some disadvantage. Obviously, some of the daily tasks of the compositors' apprentices, such as correcting proof, copy holding, etc., have more in common with the requirements of the test than do the duties of pressmen's apprentices. No attempt was made to compute statistically or to devise ways of measuring exactly the effect of either age or nature of job duties on achievement in the test.

The difference in the achievement of the pressmen's apprentices from that of the other two groups is so marked, however, that it seems probable, making all allowances for the possible influence of other factors, that the results indicate a real difference in the ability measured by the test. The extreme positive skewness of the pressmen's distribution would also seem to indicate that no factor or factors were operating uniformly to effect achievement.

COMPARISON WITH AN UNSELECTED GROUP

Figure 2 provides a striking comparison of the relative achievement of the three groups by reclassifying the *IB* distributions according to the decile limits of a normal or unselected group.[5] In general all three groups show a tendency toward an undue proportion of population in the lower decile limits of the normal group and less than normal proportion in the upper decile limits. The pre-apprentice and compositors' apprentice groups, however, show no extreme disproportions, are well represented in every decile class and, on the whole, conform fairly closely to the normal. On the other hand, 48.5 per cent of the pressmen's group had *IB*'s falling within the limits of the lowest decile of a normal group, while only 1.0 per cent had *IB*'s coming within the limits of the upper decile. Expressed in still another way, more than two thirds of the pressmen's apprentice group had *IB*'s falling within limits containing the lowest 30 per cent of a normal group.

CONCLUSIONS

The following conclusions, therefore, seem warranted by the test survey:[6]

[5] The norms upon which this chart is based are taken from *Manual of Instructions, Otis Group Intelligence Scale*. Yonkers: World Book Company, p. 74.

[6] At the time of the testing young men were apprenticed upon recommendation of the foremen in the respective shops. Applicants for apprenticeship as compositors were also given a physical examination. The major research, of which this test sur-

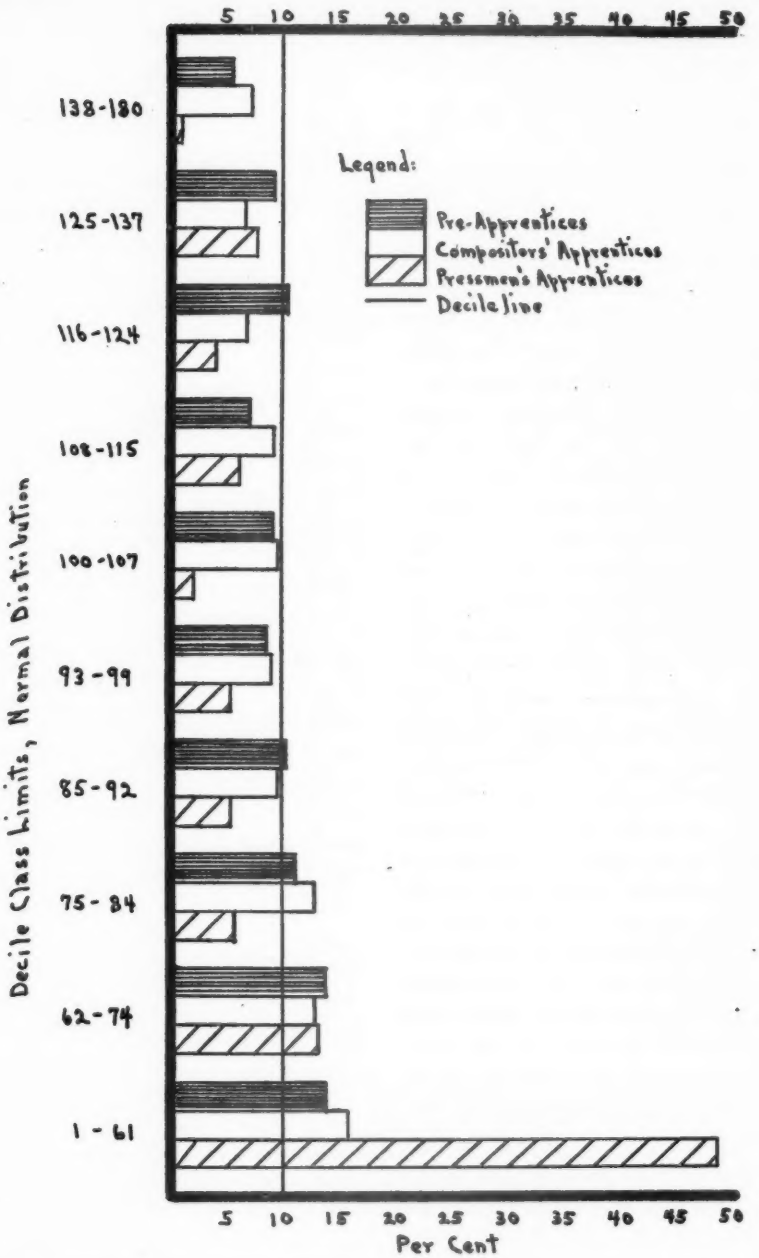

FIG. 2. INDEX-OF-BRIGHTNESS: DISTRIBUTIONS ACCORDING TO DECILE LIMITS OF NORMAL DISTRIBUTION

(Exactly ten per cent of normal distribution would fall within each class)

1. Intelligence, as measured by the Otis test, does not appear to be a factor in the selection of compositors' apprentices. All levels of ability are fairly uniformly represented in the group.

2. The pressmen's apprentices show a marked inferiority in the ability measured by the test. Apparently the dull youth finds more appeal in this branch of the industry and the bright boy feels there is less opportunity for him and enters another branch. It is probable, also, that the brighter boys are less inclined to undertake the feeder's apprenticeship required by the union prior to apprenticeship as job or cylinder pressmen and to spend the long term as feeders which is generally necessary before there is an opening for a pressman's apprentice.

3. So far as the ability measured by the test is concerned, the Central Printing Trades Continuation School pools a group of pre-apprentices who at the time of our study were at least equal to the apprentices in the industry.

(*Manuscript received February 15, 1929.*)

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vey was a part, revealed the need of more effective methods of apprentice selection for the trade. As a result, a three-year study of objective means for apprentice selection is being made by the research staff of the National Junior Personnel Service, Inc., under the general supervision of an advisory committee composed of Albert T. Poffenberger, Henry C. Link, Morris Viteles, L. J. O'Rourke, Layton S. Hawkins, J. V. Hanna, Lynn A. Emerson, and Morris Krugman. This investigation is financed coöperatively by the National Junior Personnel Service, Inc. and the Joint Boards of the School for Printers Apprentices, the School for Printing Pressmen, the School for Newspaper Printing Pressmen and the School for Machine Training. A preliminary analysis of qualifications essential for success in various branches of the trade has just been completed by Milton Hall.

Rates of Promotion in Army and Navy: A Personnel Study of Officers of Highest Rank

By Roy N. Anderson, *Teachers College, Columbia University*

The data here presented are of practical importance in showing a young man who aspires to a military career what may be his probable rate of advancement on the road to the top. They furnish a new example of the investigation of vocational histories as an aid in personnel work.

To obtain information regarding the rapidity with which promotions come in the Army and Navy, an examination was made of the vocational histories of all those officers having attained the permanent rank of Brigadier-General, Major-General or Rear-Admiral (total 350).

The data for the investigation were gathered from *Who's Who in America.* Tabulations show the median age at which these officers received appoinment to each of the ranks leading to their final status. Vocational ladders are made representing the histories graphically. These figures show that the amount of time required to travel from Second-Lieutenant to Major-General was, on the average, thirty-seven years; and that the amount of time required to travel from Ensign to Rear-Admiral was, on the average, thirty-five years. The period of time spent at each rank is also revealed.

THE past decade has shown an increasing demand for vocational guidance. Young men and women ask vocational counselors and employment managers questions relative to progress in various vocations. They inquire: "How far can I get in this vocation?" "How fast may I expect to progress in it?" "How much can I earn?" To be answered: "That all depends on you," or "There is always room at the top," does not give very much help to a perplexed youth who needs facts, not generalities, as a basis for planning a career.

More enlightening answers can be given to these questions and various scientific methods can be used in compiling the necessary information. One method proposed[1] is to study the vocational histories of individuals who have

[1] Harry D. Kitson, *The Scientific Compilation of Vocational Histories as a Method to be used in Vocational Guidance*, Teachers College Record, September, 1926, Vol. 28. Pp. 50–58.

succeeded in the occupations examine their experiences and compile them into typical patterns of vocational progress.

This investigation is an attempt to apply this technique to two somewhat similar vocations,—that of the officers in the Army and Navy. The men whose vocational careers were studied include all those who have reached the highest ranks in these vocations; namely, all the living Major-Generals in the Army and the Rear-Admirals in the Navy. The data were taken from *Who's Who in America*, (Vol. 14, 1926-27). The total number of cases studied is 350, distributed as follows: 97 Major-Generals; 116 Brigadier-Generals; and 137 Rear-Admirals.

Tabulation was first made of the age at which each of these officers attained each of the ranks in the service. Computations were then made showing the number of years spent by each officer at each rank. Medians and interquartile ranges were also computed.

AGE AND RANK IN THE ARMY

The records showed that during the Spanish-American War and the World War there were unusually rapid promotions. Many of these were only temporary. After the war a large number of officers were reduced to their former ranks and again were obliged to continue up the scale of promotions. In this investigation, temporary emergency promotions were disregarded and an officer was considered to have reached a given rank only when the commission was clearly a permanent one.

The data relating to the officers who reached the rank of Major-General in the Army are shown in A of figure 1. These officers reached the various ranks at the following median ages: Second-Lieutenant 23; First-Lieutenant 29; Captain 36; Major 45; Lieutenant-Colonel 50; Colonel 53; Brigadier-General 55; Major-General 60. The median age at which retirement took place was 63. Eighty per cent of the Army officers studied were married. The median age at marriage was 27 years. This is indicated on the ladder.

The length of time required to travel from the lowest step, Second-Lieutenant, to the highest step, Major-General, was on the average 37 years.

It will be seen from the vocational ladder that the promotions were relatively slow up to and including the rank of Major, occurring, on the average, about every seven years.

Toward the end of the career the promotions came more rapidly, at intervals of three or four years. This probably is accounted for in part by the fact that with advancing age many officers become disabled, die or reach the official retirement age, sixty-four, thus thinning out the ranks and making room for the more rapid advancement of others. In interpreting these ladders it should be recognized that the figures given are only medians, that is, the point above and below which 50 per cent of the cases fall. For example, although it would appear that these officers became captains at 36, some officers reached this rank a trifle earlier and some, a trifle later. In order to secure a true picture of conditions we must have a measure of variability showing to what extent the

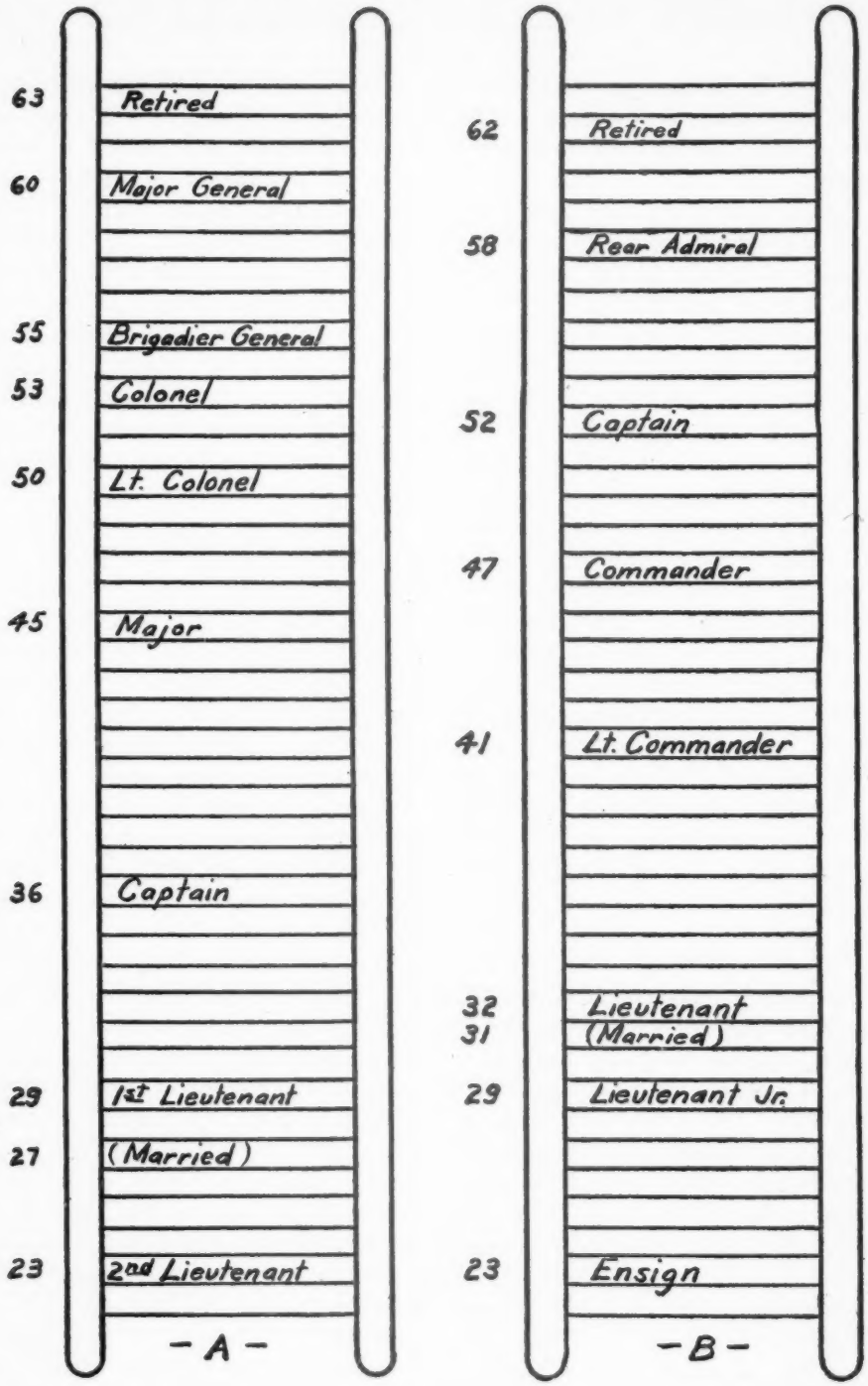


FIG. 1. SHOWING MEDIAN AGES AT WHICH SUCCESSIVE RANKS HAVE BEEN ATTAINED BY OFFICERS OF HIGHEST RANK IN THE ARMY AND IN THE NAVY

figures given are typical of the majority of cases. As such measures we have computed the semi-interquartile range and the coefficient of variability, (see table 1).

The variability is shown graphically (fig. 2) in terms of the absolute deviations of Q_1 and Q_3 from the median. These are the 25th and 75th percentile points, between which lie 50 per cent of the cases. The range above and below the median is quite small, the semi-interquartile range being from

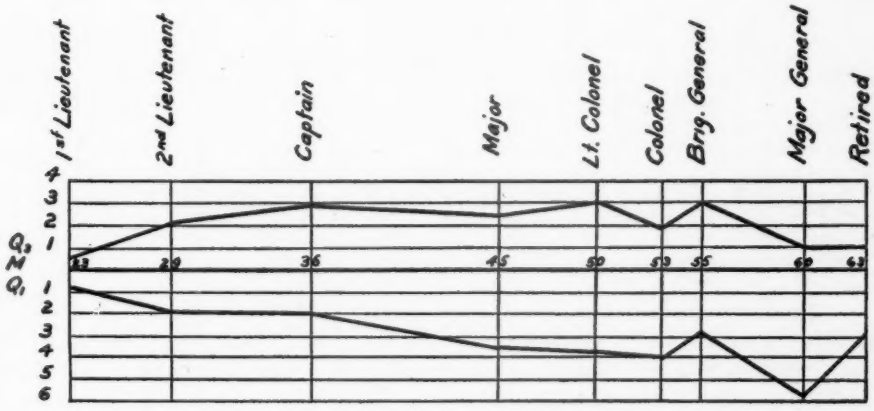


FIG. 2. ABSOLUTE DEVIATIONS IN YEARS OF Q_1 AND Q_3 FROM THE MEDIAN (ARMY)

less than one year to 3.6 years. The variability is relatively small at the extremes; that is to say, almost all the men were between 22 and 24 on being commissioned Second-Lieutenant. The reason for this can be readily inferred. Similarly 50 per cent of those commissioned Major-General were between 54 and 60 at the time of such promotion,—again for obvious reasons. In the intermediate ranks there is greater variability, though the greatest, with Lieutenant-Colonels, is only 3.6. That is to say, 50 per cent of the officers were commissioned to this rank between the ages of 46 and 53.

EARNINGS OF ARMY OFFICERS

In order to obtain information about the earnings to be expected in a military career, recourse was had to the elaborate scale fixed by Act of Congress, June 10, 1922. This provides for an annual base pay for each rank which varies according to the length of service. The method by which allo-

loted incomes were computed may be illustrated in terms of captains. The typical army history of these officers shows that at the time of receiving their commission as captain they had served thirteen years (from 23 to 36). Accordingly they would have begun their service as captain (under the present rate of pay) at $2880. To this would be added $960 rental allowance and $432 subsistence allowance giving a total of $4277. The regulations provide different allowances for officers with dependents from those without.

TABLE 1

Vocational histories of the living Major Generals of the United States Army (1926)

RANK	Q_1	MEDIAN	Q_3	SEMI-INTER-QUARTILE RANGE	COEFFICIENT OF VARIABILITY	PREDICTIONS FOR 50 PER CENT OF CASES	SALARY*
Second Lieutenant	22.7	23.6	24.3	0.8	3.4	23.5 ±0.8	B1500 R 480 S 216 2196
First Lieutenant	27.0	29.0	31.2	2.1	7.2	29.1 ±2.1	B2200 R 720 S 432 3352
Captain	34.1	36.1	39.1	2.6	6.8	36.7 ±2.6	B2880 R 960 S 432 4272
Major	41.1	45.0	47.4	3.2	7.1	44.3 ±3.2	B4050 R1200 S 648 5898*
Lieutenant-Colonel	46.1	50.1	53.2	3.6	7.2	49.7 ±3.6	B5075 R1440 S 648 7163*
Colonel	49.0	53.1	55.1	3.0	5.7	52.0 ±3.0	B6000 R1440 S 432 7872*
Brigadier-General	52.0	55.0	58.1	3.0	5.5	55.0 ±3.0	B6000 R1440 S 432 7872*
Major-General	54.0	60.0	61.0	3.1	6.1	57.1 ±3.1	B8000 R1440 S 432 9872
Retired	60.0	63.0	64.1	2.1	3.3	62.1 ±2.1	
Married	26.3	27.0	33.0	3.4	11.3	29.7 ±3.4	

* B = base pay; R = rental allowance; S = subsistence allowance. These are current rates and not the amounts necessarily received by living Major Generals when they had lower rank. "The maximum allowances which will accrue to an officer below the grade of Brigadier-General, to a Brigadier-General, or to a Major-General, will be such that the total of base pay, pay for length of service, and allowances for subsistence and rental of quarters will not exceed $7200, $7500 and $9700 respectively, per annum. Deduction of the necessary amount should be made from the rental allowances. The total of base pay and pay for length of service of an officer below the grade of Colonel may not exceed $5750 per annum."

The figures used here are based on the former scale since 80 per cent of these officers are married. After spending nine years as captain this "typical" officer reached the rank of Major when, similarly computed, his earnings would amount to $5898. (Reduced to $5750, see foot note to table 1.) Several advances in pay had occurred in the intervening nine years (see table 1).

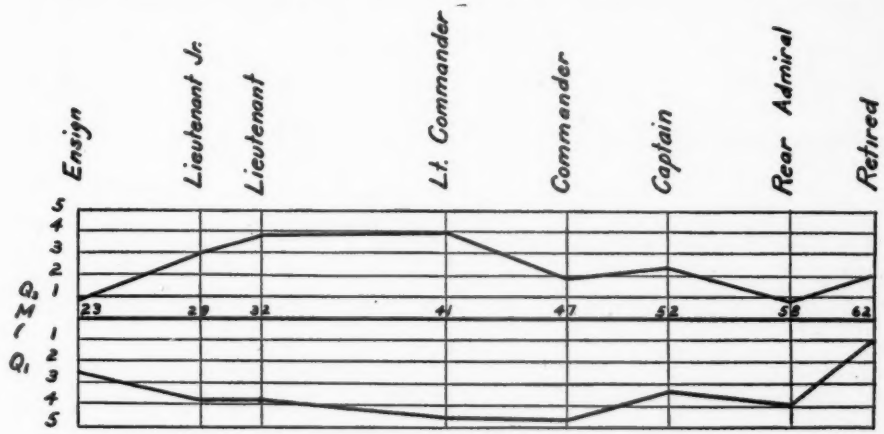


FIG. 3. ABSOLUTE DEVIATIONS IN YEARS OF Q_1 AND Q_3 FROM THE MEDIAN (NAVY)

AGE, RANK, AND EARNINGS IN THE NAVY

Rear-Admirals in the Navy reached the various ranks at the following median ages: Ensign 23; Lieutenant-Junior, 29; Lieutenant, 32; Lieutenant-Commander, 41; Commander, 47; Captain, 52; Rear-Admiral, 58. These facts are represented in B of figure 1. Seventy-nine per cent of the naval officers studied were married. The median age at marriage was 31. The median age at retirement was 62.

The length of time required to travel from Ensign to Rear-Admiral was on the average 35 years. As will be noticed on the vocational ladder the promotions in the Navy were fairly regular, occurring on the average about every six years.

The variability can be seen from figure 3 which shows the absolute deviations of Q_1 and Q_3 from the median, ranging from one year to 4.6 years. The greatest deviation is found at the rank of Lieutenant-Commander. Fifty per cent of the officers were commissioned to this rank between the ages of 36 and 45. In general the variability is slightly greater than that among the Army officers but in other respects it agrees with the conditions pointed out in the study of the histories of the Major Generals, being small at the extremes and larger at the intermediate ranks. The reasons are probably the same as those given in connection with the Army data.

Earnings computed in the same way as those relating to the Army officers, are shown in table 2. Computations are based on the amounts allotted to officers with dependents, since 79 per cent were married.

TABLE 2

Vocational histories of the living Rear-Admirals of the United States Navy (1926)

RANK	Q_1	MEDIAN	Q_3	SEMI-INTER QUARTILE RANGE	COEFFICIENT OF VARIABILITY	PREDICTIONS FOR 50 PER CENT OF CASES	SALARY*
Ensign	21.0	23.7	24.6	1.8	7.8	22.8 ±1.8	B1500 R 480 S 219 2199
Lieutenant Junior	25.1	29.1	32.2	3.6	12.3	28.7 ±3.6	B2200 R 720 S 438 3358
Lieutenant	28.1	32.1	36.2	4.1	12.5	32.2 ±4.1	B2640 R 960 S 438 4038
Lieutenant-Commander	36.1	41.1	45.2	4.6	11.1	40.7 ±4.6	B3900* R1200 S 657 5757
Commander	42.1	47.1	49.1	3.5	7.6	45.6 ±3.5	B4725* R1440 S 657 6822
Captain	48.2	52.1	54.6	3.2	6.2	51.4 ±3.2	B5800* R1440 S. 438 7678
Rear Admiral	54.2	58.3	59.1	2.4	4.2	56.6 ±2.4	B6000–8000 R1062–1262 S 438– 438 7500–9700
Retired	61.0	62.2	64.3	1.7	2.6	62.7 ±1.7	
Married	27.3	31.1	36.1	4.4	13.7	31.7 ±4.4	

* B = base pay; R = rental allowance; S = subsistence allowance. These are current rates. "When the total pay and allowances exceed $7200, the rental allowances shall be reduced by the amount of the excess above $7200."

GRADUATES OF WEST POINT AND ANNAPOLIS

It is of interest to inquire whether the graduates of West Point and Annapolis had received their promotions more rapidly than non-graduates. Eighty-four per cent of the Major-Generals were West Point graduates, and eighty-five per cent of Rear-Admirals had been graduated from Annapolis. Scrutiny of the data showed that graduates and non-graduates who reached the top attained the various ranks at about the same ages.

These figures have been kindly reviewed by the War Department and the Navy Department. The former state that: "The commissioned officers of the Army are distributed between the 'promotion' list and 'non-promotion' list. In the promotion list are carried the names of all officers in the Army, except officers of the Medical Department, Chaplains, and professors at the United States Military Academy. The non-promotion list includes all officers whose names are not borne on the promotion list. The age limits for appointment, and the promotion systems for the officers of both lists are different. For officers on the promotion list, promotion is determined by seniority up to and including the grade of colonel; and for officers on the non-promotion list, by length of commissioned service up to and includ-

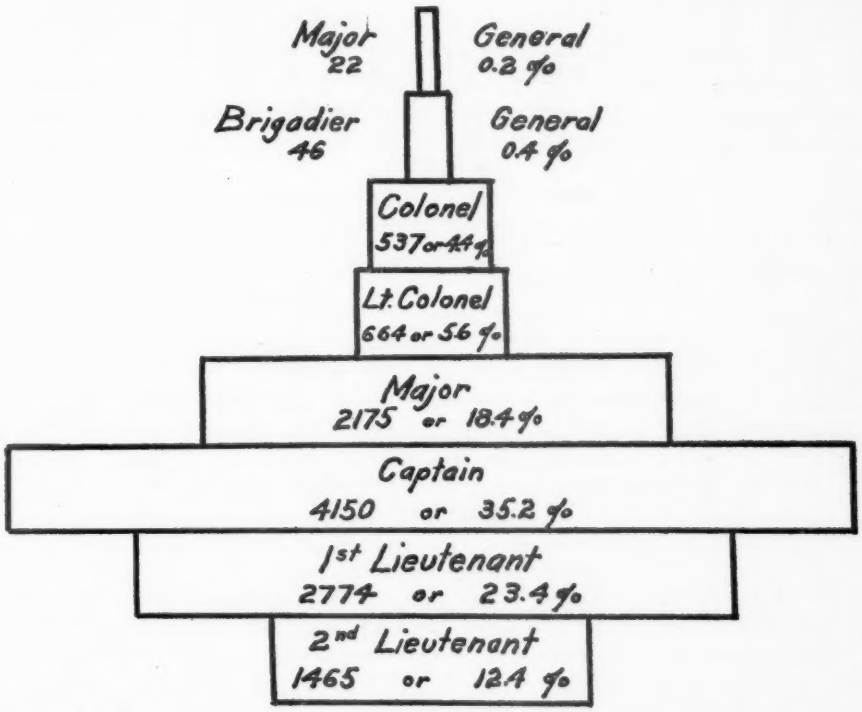


FIG. 4. DISTRIBUTION OF 11833 OFFICERS OF THE UNITED STATES ARMY (1926)

ing the grade of colonel. In both lists, promotions above the grade of colonel are made by selection."

As would be expected, relatively few of the officers in the non-promotion list are graduates of West Point; most of them are graduates of professional institutions such as schools of medicine, engineering, etc. But since our examination of the massed histories of the West Point graduates showed practically no deviation from those of the non-graduates, it seems reasonable to believe that in the long run and in the majority of cases the officers on the promotion list do not attain the generalship any earlier than officers on the non-promotion list.

The Navy Deparment informs us that the "staff corps (supply officers, surgeons, etc.) parallels the line, in promotion under recent law."

LIMITATIONS OF THIS METHOD

When figures such as these are shown, based on a study of the most successful persons in an occupation, the objection is raised that such figures show only the maximum levels of achievement, and do not reflect the history of the average persons in the occupation. It could be argued that in the military service, for example, the number who become generals is very small. This is true. The exact number and per cent at each rank authorized by Act of Congress, is shown in figures 4 and 5. One peculiar condition is revealed by these figures. We should expect that the number at

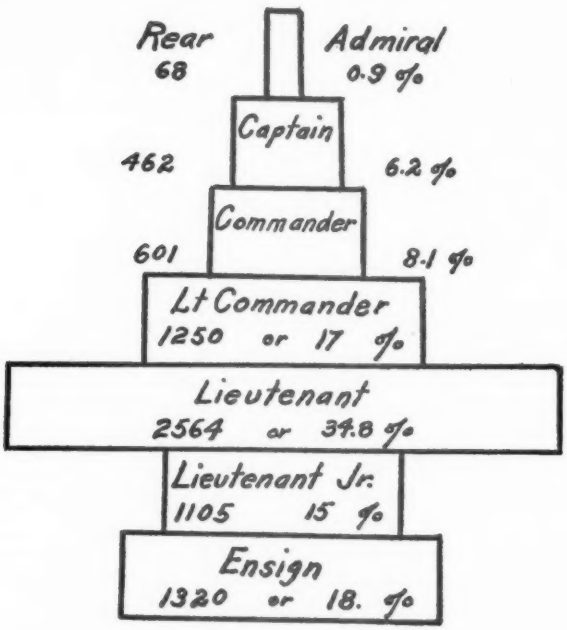


FIG. 5. DISTRIBUTION OF 7370 OFFICERS OF THE UNITED STATES NAVY (1926)

each rank would be smaller as we proceed toward the top and that they would be graphically represented in the form of a pyramid. In both the Army and the Navy, however, the number of officers does not regularly decrease as one progresses from the lowest rank. Figures 4 and 5 show that the greatest number of officers in the Army are found, not at the rank of Second-Lieutenant, but at the rank of Captain; and in the Navy not at Ensign but at Lieutenant. As a matter of fact, 35 per cent of the officers in the Army are Captains and in the Navy 35 per cent are Lieutenants. Accordingly in giving vocational guidance to a youth we can inform him that the number of openings at least up to and including the rank of Captain or Lieutenant is relatively great. Laying aside the explanation of this condition, the fact remains that it is not true that the opportunities for promotion decrease regularly as one progresses toward the top. Though the number of openings is somewhat restricted in the upper ranks, they are not limited proportionately. Our figures show that as a matter of fact, promotion comes more rapidly at the upper ranks due, as was intimated, to retirements and deaths.

Though we grant some limitation of our method we can justify it further on the following grounds: In making a study of any occupation we should at all events ascertain the maximum opportunities open at the top. All young persons who are really ambitious fix their eyes on the ultimate goal they may achieve; and some of them will certainly reach it. They should be informed, then, concerning the highest possibilities and concerning the steps that were taken by men who have attained them. This fact alone justifies us in employing what might be called the historical method and charting the vocational histories of the leaders in a field.

Furthermore, to obtain the desired figures regarding all the workers in an occupation is extremely difficult. One can always find data regarding the leaders more easily than concerning the rank and file. For example, in the present instance, all the data concerning Generals and Admirals are published in *Who's Who in America*, but no facts are given concerning the officers of subordinate rank.

TABLE 3

Ages of Brigadier Generals and Major Generals when at lower ranks

RANK	BRIGADIER GENERALS			MAJOR GENERALS		
	Q_1	Median	Q_3	Q_1	Median	Q_3
Second Lieutenant	22.5	23.3	24.2	22.7	23.6	24.3
First Lieutenant	26.0	29.8	31.3	27.0	29.0	31.2
Captain	31.8	35.5	40.6	34.1	36.1	39.1
Major	41.3	45.7	47.3	41.1	45.0	47.4
Lieutenant Colonel	46.2	50.7	54.5	46.1	50.1	53.2
Colonel	49.8	52.2	57.6	49.0	53.1	55.1
Brigadier General	52.4	57.2	61.1	52.0	55.0	58.1

Even if we had data regarding all the officers now living, we should still not be able to draw valid conclusions showing exactly how long each one is going to remain at each rank, for at the moment when we made our investigation we would not be able to tell how long an officer who was then a Captain, for example, would remain a Captain.

A little light can be thrown on the representativeness of our figures by a subsidiary investigation which we carried out. By charting the records of the officers at the next rank below—Brigadier-General—would we find any different conditions? Such a tabulation was made, based on the records of 116 Brigadier-Generals. The result is shown in table 3. Here it is seen that the ages at which they attained the various ranks are almost identical with those at which the Major-Generals reached these ranks.

A further limitation of this method which is often pounced upon by objectors, is that the study of vocational histories gives a picture of conditions as they were in the past, but not of conditions that will exist in the future; at any rate, we can not be sure that the future will conform to that of the past. We must admit that conditions in the occupations change. For example, the earnings of these officers twenty years ago were different from the earnings current now. Again, the commission of Commodore has been abandoned in the Navy within the past twenty years. It is possible also that certain factors may enter in to modify the rate of promotion which a young man may expect during the next twenty years. In fact the Navy Department informs us that the present effort of the Department is in the direction of "establishing a fairly uniform career wherein seven years will be spent in each grade after the first two (Ensign and Lieutenant Junior Grade)." According to this plan the time required to travel from Ensign to Rear-Admiral would be 35 years. This still does not differ from the figures obtained in our study of vocational histories of Rear-Admirals.

Granting all this, however, the study of vocational histories is absolutely essential to an acquaintance with the trends of an occupation. This method is analogous to that used in statistical studies in business and industry. It is a vital principle of business that one needs to study past trends in order to plan intelligently for the future. And an adequate system of vocational guidance requires the application of this technique to the occupations.

SUMMARY

From this investigation we have derived facts which give a clear picture of the experiences of men who have been eminently successful as officers in the Army and Navy. Although they will not enable a vocational counselor to predict the future of any single individual, they do give some indication of the prospects. The data presented are not vague generalities but specific figures; not opinions but objective facts; not estimates but exact quantities. The assiduous application of this method will enable us ultimately to build up a body of knowledge that will be extremely valuable in administering vocational guidance.

(*Manuscript received March 15, 1928.*)

The Interview in Training Salespeople[1]

Techniques for Instruction Based on Errors, Ratings, and Service Shopping Reports

By Natalie Kneeland, *Research Bureau for Retail Training*

The possibilities of the personal interview as a method of training have been neglected. Miss Kneeland here describes the development of a technique for handling such interviews and for training interviewers in retail stores, as worked out by the Research Bureau for Retail Training, University of Pittsburgh.

A technique has been evolved for use of supervisors in interviewing salespeople about their ratings, their errors, and the reports made on their work by service shoppers.

In this article are listed eleven difficulties encountered by such interviewers of salespeople, ten characteristics of a successful interview on a rating or a service shopping report, qualifications of a successful interviewer, and general rules to observe for interviewing on ratings, on service shopping reports, and on errors.

The points covered in the technique developed on the basis of these data are outlined briefly under the three headings: preparation for interviewing, the interview itself, and follow-up.

IN RECENT years a great deal of stress has been laid, and rightly, on the importance of checking up on the results of training efforts. Much time and thought has been invested in the development of methods of measuring the effectiveness of training in specific situations. Very little has been done, however, about imparting the information thus found to the persons most concerned. That there is need for studying the best administration of training through these means of measurement has become more and more apparent. In department stores, for example, it has been found that excellent rating scales, service shopping and error reports, unless handled with utmost care, may result in far more harm than good to a department. These reports are so personal in nature that it requires a maximum of tact on the

[1] While the actual technique reported on in this study is for the exclusive use of member stores of the Research Bureau for Retail Training, and consequently is not available for general distribution, it is hoped that the description of the procedure may prove of interest and stimulate work along this line in other fields.

part of an interviewer to get the points over, in discussing them with the salesperson.

HOW THE STUDY DEVELOPED

The particular problem reported on in this study arose in connection with handling a rating scale which buyers and floormen used in rating their salespeople. Training directors handling the interviews with salespeople on these ratings were experiencing more or less difficulty in getting the material across with the maximum of efficiency and minimum of friction. For this reason, the *Research Bureau for Retail Training* undertook to investigate the situation for the purpose of working out a technique which interviewers might follow in handling such ratings. While working on this subject it was found that identical problems arose in handling interviews on service shoppings, reports, and errors. Consequently, the study was enlarged to include these training devices as well. The major part of the work was carried out by Miss Jane Spencer, a student of the Bureau, under the direction of the writer.

GENERAL PLAN OF THE STUDY

The plan of the study was to collect aims of interviewing, difficulties encountered by interviewers together with their solutions, current practices in interviewing, and the characteristics of successful interviews. From this material, techniques for handling interviews on the three training devices were worked out. They constitute Part I of the study. On the basis of the information obtained, it was then possible to prepare a training program for interviewers. This includes a discussion of the personnel responsible for interviewing, and actual training plans. The training plans are given in detail and include such items as the scope and administration of training, lesson plans, and devices for making training effective. This constitutes Part II.

DIFFICULTIES ENCOUNTERED BY INTERVIEWERS

Difficulties which interviewers meet in handling interviews with salespeople on ratings, service shopping reports or errors were obtained through interviews with training directors, personal observation of interviews with salespeople, and a questionnaire. The difficulties most frequently encountered were found to be the following:

1. Lack of interest and good sportsmanship on the part of salespeople over ratings, or shoppings.
2. The feeling on the part of the salesperson that the rater or shopper is prejudiced.
3. Resentment on the part of the salesperson.
4. Antagonism between the rater and the salesperson.
5. Danger of hurting the older employees who feel that they have worked tremendously hard and loyally for the store.
6. Salesperson's dislike of the rating scale or shopping report, because she feels that it may be the cause of her discharge.
7. Salesperson's feeling that no one has a right in business to discuss things of a personal nature.
8. The defense tendency and the habit of presenting an alibi.
9. Complete disavowal by the salesperson of the trait or fault imputed.

10. The feeling on the part of the salesperson that she is all right because she made a good bonus.
11. Giving constructive criticism without having the salesperson think that she is being criticized unfairly.

The solutions of these difficulties were made the basis of the technique developed as the major portion of the study.

AIMS OF INTERVIEWS

At the same time that the difficulties and solutions were being collected, information was also being secured regarding the purpose or aim of the interviews and the characteristics of a successful interview. The purpose of the interviews may be summed up in the following three-fold aim: to encourage the salesperson to improve or to keep up her present high standard; to find out the cause of her deficiencies, if she has any; and to offer her concrete aid for improvement.

Ten characteristics of a successful interview on a rating or a service shopping report were mentioned:

1. It should give definite, concrete help for correcting weaknesses indicated.
2. It should encourage the salesperson to correct her shortcomings.
3. It should encourage the salesperson to keep up her high standard on those points on which she has been rated or reported high.
4. It should be handled with tact.
5. It should be handled by a person of maturity.
6. It should show the relation between a poor rating or report and poor results obtained.
7. It should make plain the fact that the rating or report is not final but only contributes to the information of the individual about herself.
8. There should exist, on the part of the interviewer, a sympathetic understanding of the person interviewed.
9. There should be an understanding, on the interviewer's part, of the conditions under which the salesperson works.
10. There should be an understanding, on the part of the interviewer, of the rating scale or shopping blank and how the rating or shopping report is made.

The qualifications set down for a successful interviewer on errors emphasizes the corrective nature of her job a little more forcibly. For such interviewing the following are necessary: a helpful attitude; tact; fairness; ability to get the salesperson's point of view; firmness; and friendliness.

The interview itself must be concrete, short, and have teaching value. The interview must also be held in private. In addition, the salesperson must be kept in a receptive mood, and be made to see the seriousness of salescheck errors.

The five traits which were stated as most essential for any interviewer are tact, including kindness; understanding and sympathy; quickness of perception; firmness; patience and self-control. These traits were made the basis of one of the lesson plans in the training for interviewers in which the trait actions were discussed somewhat in detail.

GENERAL RULES TO OBSERVE IN INTERVIEWING

On the basis of the information obtained, the following general rules for interviewing on ratings and service shopping reports were drawn up:

1. Remember that the aim of the interview is not to reprimand but to

encourage the salesperson to increased effort.
2. Find out all you can about the salesperson before interviewing.
3. Analyze the rating or report before interviewing.
4. Try to maintain an unbiased point of view.
5. Definitely attempt to establish a friendly contact at the beginning of the interview.
6. Be sure that the salesperson understands the rating or report.
7. Give the salesperson a general idea of her standing or an idea of the report as a whole at first.
8. Be sure to point out the good points of the rating or report and commend the salesperson on them.
9. Attempt to discover the cause of the weaknesses or poor service indicated.
10. Offer constructive advice for improving the weak points and strengthening the good points.
11. Provide opportunity for the salesperson to express her opinion during the interview.
12. Terminate the interview on a pleasant, encouraging note.

The general rules for interviewing on errors again emphasizes the corrective element a little more strongly. These rules are:

1. Conduct the interview in a friendly, constructive manner.
2. Remember that it is just as important to encourage the salesperson not to repeat the error as it is to get the error corrected.
3. Try to find out why the salesperson made the error.
4. Remember that the salesperson must know why what she did was wrong if she is to avoid repeating the error.
5. Be sure that she knows exactly what she should have done.
6. Be sure that she understands the trouble, delay, and expense caused by errors.
7. Close the interview on a note of encouragement.

POINTS COVERED IN THE TECHNIQUE OF INTERVIEWING

The technique of interviewing on the three types of training is divided in each case into three phases: preparation for interviewing, the interview itself, and follow-up. The following outline indicates the points covered for interviewing on ratings. This follows closely the technique worked out for interviewing on service shopping reports.

Preparation

1. Familiarize yourself with the salesperson's records.
2. Familiarize yourself with the selling situation.
3. Know how the rating is made.
4. Plan the interview carefully.

The Interview

5. Establish a friendly relationship.
6. Introduce the subject of ratings.
7. Take up the points on which the rating is high.
8. Mention the sales record.
9. Take up the points on which the rating is medium or low.
10. Offer definite aid to improvement.
11. Close on a note of encouragement.

Follow-up

12. Follow-up by means of the next rating.
13. Interview the salesperson on the floor.
14. Call the salesperson back.

Each of the topics listed above is discussed at some length. The following excerpts will give an idea of the type of content included.

Ex.—4. Plan the interview carefully

"Arrange to hold the interview as early in the day as possible, before both you and the person to be interviewed are tired.

"Hold the interview in a private place.

"Allow enough time for the interview so that you will not feel hurried. An interview on a rating scale should be a personal talk. If it is to have any value, the salesperson must have an opportunity to express her grievances and offer her alibis. If you are hurried she can see it, and will react to it.

"Decide how you will conduct the interview, with the individual to be interviewed in mind."

Ex.—5. Establish a friendly relationship

"Do not keep the salesperson to be interviewed waiting.

"Invite her to sit down in a manner which indicates that you expect the talk to be pleasant."

Ex.—9. Take up the points on which the rating is medium or low

"Point out her weaknesses, as shown in the rating, to the salesperson, and make clear any that she does not understand.

"Make an effort to find out why the salesperson thinks she had been rated low in these respects.

"If her rating of herself agrees with that of the other raters, ask her why she thinks she is poorest on these points. If she does not know, suggest reasons until you find one that she thinks might be correct.

"If the rating she made disagrees with the others, and she thinks she has been rated unjustly, call her attention again to the fact that the ratings were made by more than one person. Stress the importance to her of the opinion of those with whom she works. Ask her if she knows any reason that might lead the raters to think she is not good in the respects indicated. Suggest possible reasons. Try to make her feel that you want to help her get at the cause, not that you are trying to persuade her to admit something that she is holding back. If she continues to think the ratings are unjust, tell her that she may be quite right, but ask her to pay special attention to the things in which she has been rated low, and see if she can discover any reason for the rating. Tell her that perhaps she is creating a false impression by some small thing that she could correct easily."

Ex.—13. Interview the salesperson on the floor.

"Make it a point to have a short talk with each salesperson on the floor, and ask her how she is progressing and whether or not the suggested aids for improvement are proving helpful."

TRAINING FOR INTERVIEWERS

The section on training interviewers was prepared for the use of the training director or supervisor of service. The personnel to be trained,—that is, the interviewers,—may be training directors themselves, training supervisors, employment managers, buyers or assistant buyers, and, in the case of error follow-up, floormen.

The training is to be given by means of discussion in small informal groups, or individually. The training program includes discussion plans for four meetings. The first meeting is given over to a discussion on the advantages of personal interviewing as a training method; the second on psychological principles of learning which interviewers may use; the third on the qualities of a successful interviewer; and the fourth on the particular interview procedure under discussion. The discussion plans include content and method of procedure. In addition to these plans the following devices for varying the training procedure are suggested: a demonstration interview; difficult problems, presented in the form of situations; a sample case for discussion and the use of a file accessible to all interviewers, in which each one places difficulties which she has encountered, together with the solutions.

SUMMARY

This study carries the subject of personal measurements one step farther than is usually attempted, in that it outlines the procedure for getting across the results of these measurements to the persons most concerned. Furthermore, it anticipates the difficulties which may be encountered in performing this task by providing the necessary technique in the form of a series of lesson plans prepared especially for training the persons who will be called upon to do the interviewing.

The actual practical value of the material is yet to be tested by use. Since, however, the interview procedures are based on a combination of the most successful current practices and on those solutions of difficulties which seem to be most effective, it is believed that their use will help the interviewer solve many of his problems. Since they are presented in a form as direct and concise as possible, it should be simple to follow them. The discussion plans for interviewers' meetings were worked out in detail, with the aim of the interviewers in mind, and it is felt that the training director can use them as they are presented, or can adapt them to his own purposes. Each device suggested has been used with success in some store, so that its practical value is fairly assured.

Finally, if this study should do no more than arouse interest in the problem of satisfactorily utilizing personal measurements in training, it will have performed a much needed function.

(*Manuscript received October 8, 1928.*)

News Notes

PROGRESS OF THE BRITISH NATIONAL INSTITUTE OF INDUSTRIAL PSYCHOLOGY

The April number of the British quarterly *The Journal of the National Institute of Industrial Psychology* contains a full report of the activities of the Institute during the year 1928.

One of the most interesting features is a graph showing the growth of investigations as measured by receipts for services to business firms. These fees for professional services to industry have more than doubled in the last three years,—in 1928 amounting to over $85,000. This rapid increase appears to be due to two factors: (a) the very satisfactory manner in which the staff of the Institute carries out its investigations and the practical value of the results received by industry; (b) the excellent organization and publicity methods of the Institute.

The staff includes a total of 61 persons of whom 42 are paid investigators and research workers. It is interesting to note that of the nearly $100,000 disbursed during the year 1928 only about ten per cent was used for salaries and expenses incidental to the prosecution of the Institute's research program. Some research is doubtless also undertaken in connection with each commercial investigation; and in these investigations the Institute constantly makes use of the results of the research studies of the Industrial Fatigue Research Board.

The report gives a brief description of investigations made during the year in 29 industrial organizations. "These investigations" to quote from the published statement "have covered many aspects of industrial organization, including the layout of factories, the sequence of processes, the selection of appropriate employees, the elimination of waste of effort, material and time in production, and the attainment of greater efficiency and contentment of the employees by improved working conditions."

It is interesting to make a comparison for the purpose of determining in what direction the Institute has increased its activities. For this purpose the investigations described may be grouped under four main headings. A comparative tabulation of the description of these activities for the years 1926 and 1928 shows:

	1926	*1928*	*Increase*
(1) Management	21	24	3
(2) Personnel	2	11	9
(3) Safety	0	2	2
(4) Working Conditions	1	6	5

It is pleasing to those interested in personnel activities to note that the increase in technical services rendered to industry during the last three years has been in work in which the primary concern has been the welfare of the individual workers rather than in those activities which are more directly concerned with profits for the management. The amount of activity involving what is called improvements in management must not of course be taken as an indication that these activities have entailed any hardship or increased fatigue to workers. The training and leadership of the staff guarantees this.

The National Institute may in fact be regarded as a pioneer in obtaining a staff of university trained psychologists for the purpose of investigating and advising executives on matters of construction, planning and business organization. Its all round development and the speed of its growth must give great satisfaction to the Director and his staff, not only because they thus know of the excellence of their work, but also because they are supplying a service essential to the reconditioning of British industry.

C. S. SLOCOMBE.

FELLOWSHIP AWARDS FOR PERSONNEL RESEARCH

The Social Science Research Council has announced the award of twenty-eight fellowships for advanced study and research during the next academic year. Three of these, because of the topics chosen for investigation, are of special interest to readers of the PERSONNEL JOURNAL.

Elmo P. Hohman will make a comparative study of American and European seagoing labor in the twentieth century, with special reference to the operation of the La Follette Seaman's act.

Earle L. Rauber, University of Chicago, will study the electrification program and labor legislation in actual practice in Czechoslovakia, Austria and Russia.

Keith Sward, University of Minnesota, will make an experimental study of leadership. His headquarters will be at Stanford University.

1930 CENSUS SUGGESTION

The Committee on Governmental Labor Statistics of the American Statistical Association has submitted to President Hoover a plan for securing factual data on the extent of unemployment. It suggests that two queries be incorporated in the 1930 census: (1) "Are you now unemployed?" and (2) "Are you employed but on a lay-off without pay?" Nationwide replies to these questions would furnish specific information, as opposed to estimates made on a basis of yearly variations in payroll, of the number of unemployed workers in the United States. The adoption of this proposal is dependent on Congressional action on the Census Bill as amended by the Senate committee on commerce.

A NEW REVIEW

The *Revue de la Science du Travail* is the first periodical in the French language to be devoted exclusively to technopsychology. Its field is "the physiology and psychology of work and the prospects for its rational organization." Volume 1, No. 1 bears the date of March, 1929. It will appear quarterly under the joint imprints of the *Librairie Alcan*, Paris, and *Goemaere*, Brussels. The *Revue's* founders and directors—a psychologist, a physician, and an engineer—are drawn from three countries: J. M. Lahy, France; Dr. P. Sollier, Belgium; and J. P. Arend, Luxembourg. It has an ambitious program successfully launched in its excellent first number. In addition to original articles and general reviews in the field of its major interest, it presents reports of new procedures, advances and trends in technopsychology, and accounts of activities and organizations at home and abroad. The book reviews and periodical abstracts are most comprehensive. They make up nearly one third the content of the 179-page initial issue. The leading articles in the March number are: "Present problems of scientific management in world industry," by J. P. Arend; "Vocational psychology and the selection of apprentices," by J. M. Lahy; "Is prediction of perfectibility of motor aptitudes experimentally possible?," by Dr. P. Sollier and J. Drabs; "The cost of mental disorder in industry," by Dr. Toulouse; "Electrophysiology and the science of work," by Dr. H. Laugier; "Measurement of expenditure of energy in muscular work: Principles of the respiratory method according to recent studies," by Mlle. B. Neoussikin; "Ergology or the science of work," by Dr. P. Sollier; "Psychological profiles in vocational selection and guidance," by J. M. Lahy; and "Technopsychology in vocational adjustment in Germany: The Regional Institute for the Study of Occupations at Dusseldorf," by Dr. W. Schultz.

A supplement lists the table of contents of the most recent issues of fourteen journals. There is also a bibliography on Individual Differences in Educability, conveniently printed for clipping and transfer to library reference cards.

The PERSONNEL JOURNAL feels confident in predicting that the publication and circulation of the *Revue* will give added impetus to the international movement for the scientific study of work.

FORMS OF EMPLOYMENT CONTRACTS

Inquiry by National Civic Federation

What else besides work does one agree to give his employer when he takes a job?

What, in other words, besides an agreement as to work and pay, is involved in the modern work contract?

The National Civic Federation, through a Study Committee of its Commission on Industrial Inquiry, has set about to answer these questions. Several hundred representative business establishments throughout the country have received requests to submit to the Federation confidential information regarding their employment contract practices. Many have already replied and each mail brings additional answers, all of which are being carefully analyzed.

A preliminary survey revealed the fact that the employment contract is not the same in all industries or sections of the country. The National Civic Federation is interested to learn what differences exist, what historical or other explanations lie back of them, and whatever else will shed light on the purposes and present usefulness of existing types of contractual relations between American employers and employees.

The Study Committee in charge of this investigation is headed by Mr. Sam A. Lewisohn. The other members of the Committee are: C. S. Ching, Lincoln Cromwell, Henry S. Dennison, E. K. Hall, Michael J. Keough, Thomas McMahon, Marcus M. Marks, Charles P. Neill, Herman Oliphant, Almerindo Portfolio, and Arthur H. Young.

The Director of the Study is E. R. Burton, author of "Employee Representation."

"The employment contract," says the Committee's statement as to the purpose and scope of its inquiry, "has two broad aspects. Its primary phase concerns the work to be done and the wage to be paid for such work. In the second place, the contract contains various special or collateral provisions governing or modifying the primary matters of work and wages. Sometimes these special provisions are set forth in rules and regulations posted in the shop or printed in a rule book, it being assumed that each employee who continues on the job after learning of these rules accepts employment under the conditions thus laid down. Where there is a trade agreement with a union, the trade agreement becomes a statement of certain usages of the business; and in some cases the courts have considered these usages as collateral provisions of the individual employment contract.

"In some companies when a person applies for a job, he is required to sign one or more printed statements or agreements regarding these special collateral terms of his employment. These may be printed on the application blank, the employment record card or separately. In some cases if the employee rents a company house, the lease which he signs contains provisions which affect indirectly his rights with reference to his job."

It is the collateral provisions of the employment contract—not the specific terms as to rates of wages or number of hours of work—with which The National Civic Federation's inquiry is concerned. The preliminary survey has brought to light a wide variety of such modifying provisions of the individual employment agreement. Among the more significant are those relating to deductions from wages for dues to some specified organization to which the employee agrees to belong, or for contributions to the cost of a pension or insurance plan; payment of wages in some form other than money; assignment of wage claims; purchase of occupational or domestic supplies from some specified source; harboring in a company house persons whose presence may be objectionable to the employer; membership in labor organizations; concerted action against the employer for the purpose of altering existing terms or conditions of employment; divulging trade or industrial secrets; assignment of patent rights to inventions made by the employee; and recognition of certain specified acts as legitimate grounds for discharge.

Often offsetting obligations which the employee assumes, there are definite duties which the employer undertakes to perform. Such provisions relate to payment of bonuses for continuous, satisfactory employment; advance notice of dismissal (except in cases of discharge for cause); recognition or non-recognition of a union; procedure for adjustment of differences, including, in some cases, arbitration; furnishing "clear-

ance cards" to employees upon leaving; and a variety of other matters.

It is believed that the particular provisions of the employment contract will be found to differ according to industrial and local conditions. Information is being sought not only from employers but also from trade union officials and from the officers of numerous employers' associations in order that every bit of evidence may be discovered as to the advantages and disadvantages of the various provisions considered from the standpoint of broad social effects as well as with reference to practical business requirements.

MORTAR BOARD PERSONNEL PROGRAM

The National Council of *Mortar Board*, college honorary society for senior women, which selects its members on the basis of service, scholarship, and leadership is conducting a personnel study, national in scope. Mrs. A. C. Ramier, of Indianapolis, Indiana, as chairman of the personnel committee, has developed four lines of vocational inquiry, namely:

1. Ascertainment of the extent to which personnel work exists in the forty-three colleges having Mortar Board chapters;

2. Compilation of a directory of agencies located outside the college campus which are interested in personnel work;

3. Survey made by Miss Irene Rems, former national vice-president, of the vocational qualifications and choices of Mortar Boards graduating in 1928, which will be repeated for the class of 1929;

4. Surveys of vocational opportunities for college girls in the larger cities. Miss Mary Margaret Kern, now Editor of the *Mortar Board Quarterly*, made the first survey last year, using Chicago as the subject of her investigation. Miss Margaretta Fenn of Northwestern University personnel department coöperated with her. At the present time surveys of Philadelphia, New York City, Minneapolis, Cleveland, Baltimore and Detroit are in progress.

In addition, Mortar Board assisted with the Woman's World Fair of Chicago on Vocational Day in May, 1928, and intends to do so again this year.

The local Mortar Board chapters are starting vocational libraries, compiling records of vocations entered by their graduates, helping new students to adjust themselves, bringing vocational speakers to the campus, and working toward the establishment of personnel departments in those universities and colleges not providing this service.

I. R. I.

The International Industrial Relations Association has prepared for distribution to individuals and organizations interested in membership, a full statement of its aims and purposes from an international point of view with an added note on the particular significance of the organization for members in the United States.

The second section of the report on "Fundamental Relationships between all Sections of the Industrial Community" has also been sent to members. This volume of over four hundred pages is distinguished both in format and typography, and no less in content,—furnishing as it does the verbatim account in English, French and German of the Cambridge proceedings of the First Triennial Congress of the I. R. I., held in England in July, 1928.

Non-members may purchase either Vol. I (reports from eighteen countries presented to the Congress), or Vol. II (the actual Congress proceedings) for $1.25, and $1.75, from the Secretariat, 66 Javastraat, The Hague, Holland.

AIDS TO PERSONNEL RESEARCH

G. H. Estabrooks and J. F. Smith have furnished us with the following report of a method of handling data, in use in the personnel department at Colgate University:

"The procedure here outlined is an attempt to point out certain labor saving techniques in the study of college personnel problems. Most small institutions are placed in somewhat the same position as is Colgate. Financial support of the personnel department is restricted and while every possible encouragement is given for branching out in new and original fields, a sharp eye must also be kept on the budget.

"If original research is to be done under

these conditions we must watch our expenses at three points. First, we will use mostly those tests and measures which have a nation wide reputation, unless there is definite reason to the contrary; secondly, we must get the data from these tests collected in the most convenient possible form; and thirdly, we must have this worked up rapidly by untrained labor.

"Our first point will be of interest only in that it points out a means for collecting data. Our entire Freshman class are given the following tests: 1. The Intelligence Test for College Freshmen as prepared by the American Council on Education; 2. The Colgate Mental Hygiene Test, Personal Inventory B-2 (for psycho-neurotic traits); 3. Personal Inventory C-2 of the same series (for introversion-extroversion); 4. The Pressey X-O Test; 5. The Ascendence-Submission Study of the Allports; and 6. The Vocational Interest Blank of E. K. Strong, Jr. We happen to use this series because of our particular interests. Other institutions would prefer a different combination.

"Our second suggestion is possibly of broader application. This consists of a record form containing all the essential information for several research problems. It might if one may use the term be called a research psychograph, and is designed to supply certain information in its most concise shape. Fig. 1 shows the present form.

"Entrance requirements standings, arranged in quartiles by the Dean of Admissions, are entered in the first column. Only scholastic standing is here considered and there is naturally a certain subjective element in this particular rating.

"Intelligence according to results on the test prepared by the American Council is entered in the second column. Actual percentile scores are recorded.

Ent. Req.	Int.	Grades				A-S	C_2	B_2	Pressey X-O Types			Mental Hygiene	Athletics				Ex-Curr. Activ.				F
		1	2	2	4				T. A.				1	2	3	4	1	2	3	4	
Q_1										F											
										D											
Q_2										SF											
										S											
Q_3										H											
										P											
										M											
Q_4										N											
										I											

FIG. 1. GRADES, TEST SCORES AND RATINGS. INDIVIDUAL RECORD FORM USED BY COLGATE UNIVERSITY PLACEMENT BUREAU

"The next column gives us spaces for grades over the entire four years. Gross scores in terms of quality points are here used,—black ink, for the first semester, red for the second.

"*A-S* gives us the percentile ranking of the particular student in the Ascendance-Submission Study.

"C_2 gives the same for introversion and B_2 for psycho-neurotic traits on the Colgate Mental Hygiene tests previously mentioned.

The Pressey *X-O* test is entered in detail. Total affectivity according to percentile rank goes in the first column while

the gross scores on the particular traits in fear, disgust, etc. go after these letters in the next column.

"Mental hygiene as a heading is introduced immediately after these scores because we hope to find some relation between Pressey *X-O* or C_2 and personality difficulties. In this space are entered, in very annotated and symbolic form any breaches in discipline, behavior peculiarities or other points which may come under the heading of mental hygiene. Quartile ranking will be practically worthless here.

"Needless to say there is a big subjective element in the next three columns. In athletics we have to rely on the opinions of the gymnasium authorities. Participation in varsity and intramural athletics, along with the general gymnasium record are of use here.

"Extra-curricular activities again introduce a subjective element. Managerships of various sports, membership on the staffs of student publications, activity in band or glee club and other campus activities are all considered in this rating.

"Finally, *F* stands for fraternity. On our campus we have a pretty sharp hierarchy in fraternities. Moreover about one half of our student body belong to no fraternity, while perhaps one half of this neutral body are in a strong Commons club. This makes rating here comparatively easy.

"Compilation of this material on such a blank takes a surprisingly short time once it has been collected. Student help can then rapidly transfer it to distribution tables, after which it is a simple matter to apply statistical treatment. Such a technique not only gives a definite saving in time and expense but also suggests problems simply by accumulating data in such a way that possible trends are easily recognized."

SMITH COLLEGE

The Institute for the Co-ordination of Women's Interests at Smith College is offering for the first time a Summer Institute, to be held from June 26th to July 17th. The courses are designed to give the results of the four years' study made by the Institute for the Co-ordination of Women's Interests. The principles of co-ordination, of vocational adjustment, and of mental hygiene in family life will be considered and discussed, and there will be demonstrations of practical methods in household organization.

TAYLOR SOCIETY POSTPONES SPRING MEETING

Because of current unrest in the textile trade, the major industry of the South, it was deemed advisable to postpone the meeting of the Taylor Society, announced for May 1 and 2, in Charlotte, N. C. Although realizing that the situation in many respects made it a favorable time for the discussion of management on the basis which it is the purpose of the Society to promote, the action of postponement was taken as a means of avoiding the introduction into the planned discussions of factors of possible misunderstanding, involving the distinction between scientific management and efficiency systems.

MINNESOTA'S SESSION FOR SELF-APPRAISAL

The University of Minnesota during its coming summer term will again conduct the "Session for Self-Appraisal" offered last summer as an experiment. The "Session" is described as an attempt to help young people answer these three questions: (1) Do I want to go to college, or could I profit more from some other type of special training? (2) If I go to college what should be my line of study and interest? (3) What vocation should I most seriously consider as I prepare for my life's work? Registration for this intensive six weeks course was limited to 150 specially selected boys and girls who are being graduated this year from high schools throughout the state of Minnesota.

FORTHCOMING MEETINGS

The Personnel calendar schedules the following meetings for the early part of the summer:

June 12–25. SOUTHERN COLLEGE PERSONNEL CONFERENCES. Annual. Blue Ridge, N. C.

June 18. PHILADELPHIA PERSONNEL ASSOCIATION. Final Meeting.

June 19–21. INTERNATIONAL MANAGEMENT CONGRESS. Paris.
June 19–22. SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Annual Meeting. Columbus, Ohio.
June 26–July 3. NATIONAL CONFERENCE OF SOCIAL WORK. San Francisco.
June 30–July 5. NATIONAL EDUCATION ASSOCIATION. Atlanta.

PERSONAL ITEMS

Dr. DONALD A. LAIRD, Director of the psychological laboratory at Colgate University, has been appointed technical adviser to Eric C. Kunz, executive manager of Givaudan-Delawanna, Inc., manufacturers of chemical aromas with factories in Geneva, Lyons, and Passaic, N. J.

Dr. WILLIAM T. ROOT, professor of psychology in the University of Pittsburgh since 1920, will become head of the department of psychology on July 1, 1929, succeeding Professor J. H. White, who has resigned as head in order to devote all of his time to the new division of research in personality problems.

Dr. FRED C. SMITH, Editor of the Vocational Guidance Magazine, has recently been named to succeed Miss Miriam Carpenter as Appointment Secretary at Harvard Graduate School of Education.

Book Reviews

PERSONNEL AND LABOR PROBLEMS IN THE PACKING INDUSTRY

By Arthur H. Carver. Chicago: University of Chicago Press, 1928. Pp. 226

PROFITABLE PERSONNEL PRACTICE

By Henry Bruere and Grace Pugh. New York: Harper & Brothers, 1929. Pp. 454

REVIEWED BY EDWARD S. COWDRICK

Since 1923, the University of Chicago, in coöperation with the Institute of American Meat Packers, has offered a series of courses designed primarily for executives and employees in the packing industry. Mr. Carver's book doubtless was intended mainly as a text for use in these coöperative courses. It contains specific information in regard to the meat industry and much of its illustrative material is derived from packing house practice. Nevertheless, the book is of sufficiently universal application to make it of service to the general reader and a useful addition to the tool chest of a personnel director in any industry. Mr. Carver brings to his task a successful experience in industrial education and personnel administration. His book gives evidence of thoughtful observation of causes and trends in labor management.

Within only a little more than two hundred pages, it is not to be expected that every branch of the whole science of industrial relations would be given fundamental or thoroughgoing treatment. The author has found it necessary to use a selective process and to lay the greatest emphasis upon those aspects of the subject which he considers most important for his immediate purpose. The chapters on recruiting, employment and placement are satisfactorily adequate. The treatment of wages, salaries, and financial incentives is somewhat more casual. The discussion of employee representation, while comparatively brief, is carefully thought out and gives an understandable outline of the representation movement, particularly as it has affected the packing industry. There are intelligent discussions of education, training, and foremanship.

Mr. Bruere and Miss Pugh would be the last to contend that *Profitable Personnel Practice* presents a fundamental discussion either of theories or of methods in industrial relations. On the contrary, they explain in their preface, it "is not intended so much to present a philosophy of industrial relations as to provide a practical reference book for the man of affairs." The book is in fact mainly a compilation of material collected by the Policyholders Service Bureau of the Metropolitan Life Insurance Company. On each of the topics treated, information is given regarding the practices of various representative corporations and this information sometimes is supplemented by forms, records, and other illustrative data, and by quotations from men directly concerned in the administration of labor policies. The detailed and concrete character of this material gives the book value,

particularly to the employer seeking guidance in the initiation of a modern labor policy.

In their effort to furnish suggestions and to point out sources of information and assistance, the authors do not hesitate to recommend organizations or even individuals, and occasionally they come close to the border of gratuitous advertising. The text is marred by numerous errors indicative of inexcusable carelessness in either editing or proof reading.

WAGE ARBITRATION, SELECTED CASES, 1920–1924

By George Soule. New York: The Macmillan Company, 1928. Pp. 294

REVIEWED BY ARTHUR HOWARD SUTHERLAND

The preparation of this book was undertaken by the Labor Bureau, Inc., by agreement with the Workers' Education Bureau. It shows the workings of an arbitration board in hearings on wage disputes. Each case is treated in the following manner: (1) question stated; (2) union argument; (3) employers' argument; (4) argument on access to books and records; (5) union rebuttal argument; (6) employers' rebuttal argument; (7) decision of arbitrators.

Four cases in the printing trades, a case in one of packinghouse trades, three railroads, and four garment trades disputes are covered. The introduction points out some of the differences in conduct of an arbitration board as compared with court procedure.

CAREERS

By Esca G. Rodger. New York: D. Appleton & Company 1929. Pp. 186

REVIEWED BY ARTHUR HOWARD SUTHERLAND

Boys will find this book interesting and illuminating. It tells of the opportunities and difficulties of occupations, and the teller is a leader in the field. William Allen White is interviewed regarding the opportunities in journalism; Dr. William J. Mayo tells of the present opportunities in medicine. There are authoritative statements regarding the occupations of farming and teaching, business at home and abroad salesmanship, law and engineering. The author has done a good job of interviewing and of writing the account of her interview with each celebrity, making the result worth while for the young American boy.

AN OUTLINE OF CAREERS FOR WOMEN: A PRACTICAL GUIDE TO ACHIEVEMENT

Doris E. Fleischman, Ed. Garden City, N. Y.: Doubleday, Doran, 1928. Pp. 514

REVIEWED BY BESSIE BUNZEL

Careers for Women contains forty-three chapters, each of which is written by a women who has achieved marked distinction in some special line of activity. The book aims to help the young worker just starting her business life to select that type of work which seems to offer her the greatest scope for personal satisfaction, as well as to provide her with a means of livelihood. It presents practical information concerning

the various professional, industrial and commercial opportunities open to intelligent and ambitious women in America. From it we get an idea of the temperamental requirements and intellectual abilities which any given occupation demands; the training necessary in order to achieve success; the consecutive steps in progress to be anticipated; and the rewards and ultimate goals to be won. It should also prove valuable to the woman who has already chosen her vocation, since from it she is likely to gather many interesting tips applicable to her own work. On the whole, the book is a most interesting compilation, written by women obviously having the greatest enthusiasm for and delight in their work; it bears witness that women have already gained positions of real prominence and responsibility in a vast variety of business enterprises.

But in spite of the undoubted success which these women have achieved, they admit in almost every case, that there still exist very substantial handicaps against the woman worker, even though theoretically she is no longer barred from entering freely into the professional and business life of our day. Doris Fleischman, the editor of the book, sums up this side of the situation succinctly in her extremely interesting chapter on Public Relations, where she points out that the special problems confronting the gainfully employed woman "are purely psychological, and based on the definite amount of prejudice that remains in many men's minds against the effectiveness of women in the commercial and industrial world. This usually is combatted by convincing men through intelligent handling of problems, and not by slaying the dragon of anti-femininism." And in most cases, throughout the book, when discrimination is discussed the comments made are equally good-humored. As opposed to this acquiescence in the *status quo*, Marcia Mead sounds a distinctly militant note in her chapter on architecture and states that her own "chief difficulties have not been that I could not do the work, but that the minds I have had to deal with were unable to grasp the idea of working with a woman." At the same time, it is apparent that she, above all the other women writing in this book, shares the prejudices of her male confreres and thinks there is some justification for the predominant male attitude. Nevertheless, Miss Mead's chapter is most stimulating and contains a point which one would expect to encounter far oftener than one does, namely, that a thorough knowledge of English and a constant study of languages are essential for success, even in work apparently far removed from niceties and subtleties of style. It seems to this reviewer, likewise, that it is the common inability to express one's ideas in forceful, concise and polished English, and with some degree of literary distinction, which vitiates so much of our current scientific work. The writing of many scholarly treatises is so feeble, undistinguished and dull that all except technicians are discouraged from reading them; as a consequence, valuable information lies unknown and sterile.

As is to be expected, the chapters are unequal in merit, though on the whole, they are adequate. At the same time, certain ones stand out distinctly as being above the general high level. Such for example, is the sincere, straight-forward chapter on "Child Welfare" by Dr. S. Josephine Baker and the excellent one on "Literature" by Gertrude Atherton. Although it is one of the most difficult subjects to handle, because the requirements for a successful literary career are vague and intangible, rather than specific and clear cut, it offers a vivid illustration of the difference between mere competency and brilliance.

As against its many admirable qualities, one word of criticism must be voiced. Unfortunately the book does not fulfill the promise on the cover that "it is a practical guide to achievement." Its principles are for the most part vague and general; they constitute no workable formula for gaining a foothold on the top rungs of the ladder. The book merely touches the high spots in a number of given occupations; but it points inevitably to a conclusion which we had reached long ago—that success is almost always entirely dependent upon personal ability and initiative.

INCENTIVES TO STUDY

By Albert Beecher Crawford. New Haven, Conn.: Yale University Press, 1929. Pp. 206

REVIEWED BY ARTHUR HOWARD SUTHERLAND

This volume is an analysis of the results of a questionnaire filled out in 1926 by approximately 50 per cent of the students of Yale University, with the support of a students committee comprised of representatives of the classes of 1926, 1927, 1928, 1929.

The questionnaire confronted the student with detailed inquiries about his educational background, reasons for choosing courses, judgments as to the value of courses, personal expenditures of time and money, choice of vocation, and the like.

Among the results of the analysis are the following:

1. Yale men differ widely in mental ability, and there is very little relation between the time spent in study and the ability of the student.
2. The student body divides into two groups as regards money allowances: those who have large allowances and those who are self-supporting. Conditions at Yale seem to have eliminated the middle group of fairly sufficient financial allowance from home.

   Self-supporting students in general spend more time in study and receive better grades than does the other group. This is not due to differences in mental ability.
3. Sons of non-college graduates make in general as good records as do sons of college graduates. Sons of professional men make records in general better than sons of business men.
4. Those who enter college with a purpose, or who achieve a purpose early, make better records than do those who wait till graduation to decide on a future career. Those planning to enter a profession are better academic risks than are those looking toward business.

Summarizing the first portion of the book, the author believes that the outstanding criterion of success in college is purposive motivation. Students in Sheffield Scientific School where purposes and aims are generally vocational and professional prefer the required courses; while students in Yale College prefer electives. Courses out of line with a major subject, and required by the college in the interest of broader culture, fail to yield intellectual breadth as intended, since they lack the purposive motivation which is a constant incentive in the major, or in the vocational course.

There is a variety of incentives to profit by the opportunities offered at Yale, according to the students' reports. It is significant that these incentives evolve in larger degree, from—not the classroom—but extra curricular activities. The correlation of grades and mental ability among those who engage in extra curricular activities is .46; of those not in such activities .30.

The advantages of leisure and wealth do not inspire students to scholastic effort. Some self-supporting students have time for extra curricular activities and show a correlation of grades to mental ability of .49—as against .44 for the non-self-supporting group. Self-supporting students who are not in activities correlate .33—as compared with .29 for the non-self-supporting. Football players show the highest index of marks to mental ability; while the highest marks go in general to those who devote themselves to dramatics, debating and music clubs. The average variation however makes the figures of doubtful value.

Suggestions from this study are significant. The author holds throughout to the belief that the cultural studies are of great value but points to the fact that the students do not know and do not appreciate this value. Success on the part of the instructor in charge of a class is dependent to a degree upon bringing these values within the comprehension of students and discovering a means of developing motivations and other cultural incentives within the subject matter taught.

AN OUTLINE OF SOCIAL PSYCHOLOGY

By J. R. Kantor. Chicago: Follett Publishing Company, 1929. Pp. 416

SOCIAL PSYCHOLOGY: THE PSYCHOLOGY OF POLITICAL DOMINATION

By Carl Murchison. Worcester, Mass.: Clark University Press, 1929. Pp. 210

REVIEWED BY ARTHUR HOWARD SUTHERLAND

It is the purpose of an outline to define and delimit a field of inquiry. Professor Kantor attempts this for Social Psychology by noting the distinguishing characteristics of problems which other social sciences customarily refer to psychology. Assuming that social sciences are a unit with no cleavages, Social Psychology then cannot be set off as a separate discipline. It will find its problems in each of the social sciences and aim to be a helping science using its own techniques and viewpoint.

Psychological phenomena arise in the interactions of persons and stimulus objects. Whenever a thing, person, condition or situation elicits common responses from two or more persons, the group is formed as a fluid collectivity (lasting only so long as the thing has appeal); and the thing, person, condition or situation may be said to possess a psychological attribute (its capacity to elicit group response). This attribute may or may not be named, but is of a non-physical sort, illustrated by the mammal which to one group possesses the attribute "unclean," to another the attribute "sacred."

Such a stimulus object, by reason of the common group response, is said to be institutionalized. The peculiar interest of Social Psychology, therefore, is in the responses to institutionalized stimulus objects.

Terms commonly used by other social sciences take on a new meaning for Social Psychology. Stimuli are not perduring or static attributes of objects, in the belief of the author. An advertising slogan may for a time be institutionalized, but lose its appeal and be discarded. A sociological group is relatively perduring—*e.g.*, a tribe, a profession, a board of directors. But when a group is in process of institutionalizing some new object, it can no longer be regarded from the same point of view. For some purposes the group solidarity is maintained. For the new purpose the group divides, some favoring, others opposing, some dropping out, others taken in. The group is fluid. The point of view of Social Psychology therefore diverges from that of the other social sciences in the use of some of the common concepts.

It seems to the reviewer that this delimitation may be interpreted too narrowly. Habit formations and modifications, together with the conditions under which these phenomena occur, are certainly within the province of psychology. When the group is responding by following the line of habits, by switching to another set of habits, by forming new habits, or by making novel responses which if continued might lead to the formation of habits—the behavior of the group and the peculiar quality of the stimulus object are interesting to psychology. In other words, the genetic point of view assumes, as a matter of methodology if for no other reason, a scientific approach to establish facts which may be used to determine progress or growth.

The author's viewpoint is that groups are essentially sociological. As groups they are of interest to the Social Psychologist only so far as they reveal a psychological problem. When a group has acquired or is acquiring a shared or common response to

definite stimulational value, there is a psychological problem. The Social Psychologist is prepared to find an interest in groups of any size, from two persons to many. He will therefore wander over the field of all the social sciences as a specialist with a limited interest.

Professor Murchison in his book undertakes from an excellent outline to define the field of Social Psychology; but so many irrelevant impulsions crowd upon him along the way that his expository flight gives the impression of rashness and immaturity.

BORN THAT WAY

By Johnson O'Connor. Baltimore: Williams & Wilkins, 1928. Pp. 310

Reviewed by Harry D. Kitson

This book with its challenging title represents the earnest search of one man for something which, since the time of William James, most psychologists have given up hunting for—the soul. The tools with which he conducts his search are tests with pins, numbers and blocks, which in the words of the author "constitute the wrappings of that strange something which makes an individual, and is sometimes called the soul."

The author starts out with a discussion of the inheritance of physical characteristics such as color of eyes, and then applies this mechanism to the inheritance of mental characteristics such as mechanical aptitude, clerical aptitude and the like.

In support of such reasoning the author offers the facts: (1) that on tests such as those just mentioned individuals show marked variations, differing from each other more widely than they differ from each other with respect to physical features; (2) that on repeated testings these persons retain similar positions with respect to these mental traits; therefore these mental characteristics must be inborn.

This concept which Mr. O'Connor presents very interestingly is one that should be examined carefully for it is held by a number of psychologists and personnel workers who though they might disclaim the rather bald formulation just made, still follow it implicitly or "subconsciously."

In examining it we should ask three questions: 1. Is there such a thing as a general abstract mental trait, for example, mechanical aptitude? 2. Can it be measured by a test (for example, the wiggly-block test)? 3. Is the mental trait passed down from parent to offspring in the way that for example blue eyes are?

As to the first of these questions, neither Mr. O'Connor nor any other investigator has proved that such mental traits exist (with the controversial exception of intelligence). On the contrary the best psychological teaching of the past fifty years has been leaning away from it. The so-called faculty psychology of the early nineteenth century has been discredited by the experimental work of the twentieth century. Human reactions are now regarded as specific, not general. One is surprised, therefore, to hear Mr. O'Connor in 1928 testifying to a belief in (shades of Gall and Fowler!) "an inclusive faculty which may be called *symbol sense*."

Another consideration would be brought forward by the behaviorist who asserts that in applying a test to a human being the only thing we measure is a unit of *behavior*; that to interpose a "mental trait" such as "mechanical aptitude" or "clerical aptitude" is unwarranted.

This points to an answer to our second question. Merely to *assert* that a test measures a given mental trait is not proof that it does so. It has been pointed out repeatedly by psychologists of the past generation that a test measures merely what it measures. And to assert that the wiggly-block test or the number checking test measures "mechanical aptitude" or

any of the other "elusive mental traits" for which Mr. O'Connor is seeking is gratuitous assumption. In arguing that his tests measure mental-vocational aptitudes, Mr. O'Connor presents as proof that the measures he gets are distinct from general intelligence. As a matter of fact, when we scrutinize his figures we find grounds for believing that the test is really another intelligence test. For (as shown in the figures facing page 35) the vocational groups he tested stand in a hierarchy as follows: engineers, draftsmen, and mechanics. Surely this is an intelligence hierarchy indicating that the wiggly-block test, if it measures anything, tests intelligence.

But the most serious difficulty in believing that this or any other test measures mechanical aptitude is that no criterion of mechanical aptitude has been furnished. What is mechanical aptitude,—aptitude for mechanical activities? But they are so various, ranging from gross activities such as running a steam roller to such delicate manipulations as assembling a watch. And just because a person is "handy" in the one is no assurance that he will be handy in the other.

The criterion Mr. O'Connor used was presence in a group of engineers, draftsmen, or mechanics. He has not shown, however, that these men had anything in common by way of mentality. The things they were doing were, according to his own statement, exceedingly diverse: designing, constructing (things as various as houses and sewers), working with sheet-metal, etc. Now while in loose speech we class many of these as mechanical activities, we have no grounds for asserting that there is a common *psychological* stratum underlying them. And until some one finds these grounds we can never justifiably call a test a test of mechanical aptitude. Indeed it is just as reasonable to hold that there is no such thing as mechanical aptitude as to maintain that it exists.

Let us now examine the third question, namely that special occupational aptitudes are inherited. True, Mr. O'Connor uses the word "inborn," but if a trait is inborn it must have been inherited as blue eyes are inherited. He describes the mechanism as follows: "The chromosomes . . . . are the mechanism by which physical characteristics are believed to pass from generation to generation. It is a long way from the germ cell to the number checking and the block assembly, and yet considerable evidence . . . . leads to the belief that, with full knowledge and understanding of the germ cell and the forty-eight tiny particles which it encloses, one might predict, with considerable accuracy, the initial speed with which the mature individual would check the numbers and assemble the nine wiggly blocks."

The factual material on which Mr. O'Connor asks us to accept this doctrine is that on successive re-testings with any one of his tests, persons tend to stand in the same relative position, and prolonged periods of training do not change materially the relative positions. (As a matter of fact this tendency is not so high. The correlation between two parts of his "Work Samples," Number One, page 95, is only .74—not a very high index of reliability.)

This can not be accepted as evidence that the alleged trait measured by the test is inborn. To prove that, one would be obliged to obtain the reaction to the test of individuals representing successive generations. Perhaps such proof were too much to demand, since, according to hypothesis (the author makes much of the Mendelian laws), an individual might inherit a trait from any one of his thirty-two great-great-great grandparents, who could not well be summoned to the laboratory by any single investigator.

The question at issue is not whether the Mendelian and other biological laws govern the inheritance of mental things, but whether they govern the inheritance of mechanical, clerical, and other occupational behaviors. Now, the behaviorist is strenuous in insisting that occupational activities are products of experience or at least overwhelmingly affected by it.

Rather than to explain aptness in mechanical manipulations on the grounds of inheritance we ought to use the Law of Parsimony, and never ascribe a phenomenon to inheritance until we have tried

all simpler explanations. A behaviorist would suggest many things that might explain why certain persons stand high in mechanical tasks and others do not. A Freudian would find the reason in some early experience, perhaps as early as the sixth month.

The author's argument from similarity of test performance after repetition and practice does not hold consistently, for he gave his test to two individuals, one who performed the operation in thirty seconds, another in thirty minutes. Both then repeated the test twenty times. The first did not change his score, having already attained the maximum speed. The second, however, after twenty trials, "reproduced the accomplishment of the other so well that a new-comer, entering the laboratory after the twentieth lesson, could not have distinguished the slow analyst from the fast." This makes the test appear to be not a test of anything innate but of an acquired skill.

As will have been gathered from the foregoing discussion, Mr. O'Connor's book consists of the description of the way in which he has used instruments which he calls Tests for Clerical Aptitude, Tests for Mechanical Aptitudes, Tests for Finger Dexterity, Tests for Tweezer Dexterity, Tests for Group Contact or Retiring Personality. With these tests he has selected employees who do good work in a factory and has weeded out those who are not likely to do good work.

The book is divided into two parts, the first 159 pages consisting of mystical musings and the last 147 pages consisting of an Appendix containing descriptions of the tests, directions for administering them, and tables and charts showing the standings of the subjects who have been measured by the tests.

Mr. O'Connor commands praise by presenting all his figures so that the reader can interpret them for himself, or repeat the investigations by way of re-checking. We also commend the interesting and readable style of the text. Free of involved technical terms, it is written so that the intelligent layman can find pleasure in reading it. But the thirty pages beginning with 167 contain veritable vocational prescriptions of a nickel-in-the-slot order which would be severely censured by a practical vocational counselor.

The most valuable feature of the volume to investigators, is Appendix III, pp. 227–310, containing tables of frequency of the word-reactions given by 2000 persons to each of the 100 stimulus words of the Kent-Rosanoff series. Mr. O'Connor publishes in convenient reference form the frequencies originally obtained by Doctors Kent and Rosanoff, side by side with his own data from 1000 subjects, permitting many significant comparisons.

Whether or not one agrees with Mr. O'Connor's brand of vocational psychology, one must take seriously the fact that by means of these tests he has been able to select persons for the manufacturing establishment where he has been employed who do better work than those who do not stand so high in his tests. As a practitioner, then, he has performed a genuine service to the field of employment. He would have made a better contribution if he had not undertaken to defend the thesis of his title: "Born That Way."

EXPLORING YOUR MIND WITH THE PSYCHOLOGISTS

By Albert Edward Wiggam. Indianapolis: Bobbs-Merrill Company, 1928. Pp. 419

REVIEWED BY C. J. HO

One of the social sciences which the general public understands least, perhaps is psychology. Psychology has grown from the academic soil and, except in industry, little application has been made outside of the educational field. Yet in everyday life there has never been a greater need for psychology than there is today. As society becomes more and more complex, individuals find it increasingly difficult to

adjust themselves to life situations. The only solution is better understanding of the principles of human behavior. The need has long been recognized for making the discoveries in psychology better understood by the layman, but the attempt to do so has somehow been delayed. Therefore, Mr. Wiggam's presentation of psychology in everyday language meets a timely need and should be given a welcome by both the psychologist and the layman.

Mr. Wiggam's new book consists of a series of interviews with prominent psychologists. To students of psychology, most of the material is familiar. It begins with Thorndike on how the mind works. The theory is clearly and yet quite accurately expounded. Terman's study of bright children is told as interestingly as is possible with such technical material. Seashore's study on musical ability is presented with its practical applications. Dr. Cattell's account of the development of psychology should be of value to those interested in psychology. While all this may be very familiar to students of the science, this perhaps is presented to the public for the first time in an understandable and readable manner.

The studies on personality by Laird and Adams are perhaps of questionable value. All psychologists are more or less interested in this subject. Some have attempted to determine the nature of personality and to devise means of measuring it but so far none has been able to find anything of great validity. While all the personality rating scales may contribute to the development of a generally accepted standard measurement of personality, they must be said to be still in the stage of experimentation. They are interesting and suggestive, but it may be dangerous if the material is accepted without discrimination by the untrained reader. Perhaps it is because of the popular interest in personality and the general demand for something practical that Mr. Wiggam presented such studies at their face value.

Mitchell's report of his experience in mental adjustments should be helpful in everyday life. May and Hartshorne's study on character tests, and Miles' study of historical genius, both throw light on some of the current problems in psychology. But if one wishes to be strictly scientific one must accept their results with reservations. Contrary to the author's opinion, the reviewer does not feel that it is appropriate to include Dr. Pupin's discourse on science and religion with psychological studies. The presentation of the psychological material does not give one the feeling that psychology is taking men away from God; and there is no need in this connection for reassuring the reader to the contrary.

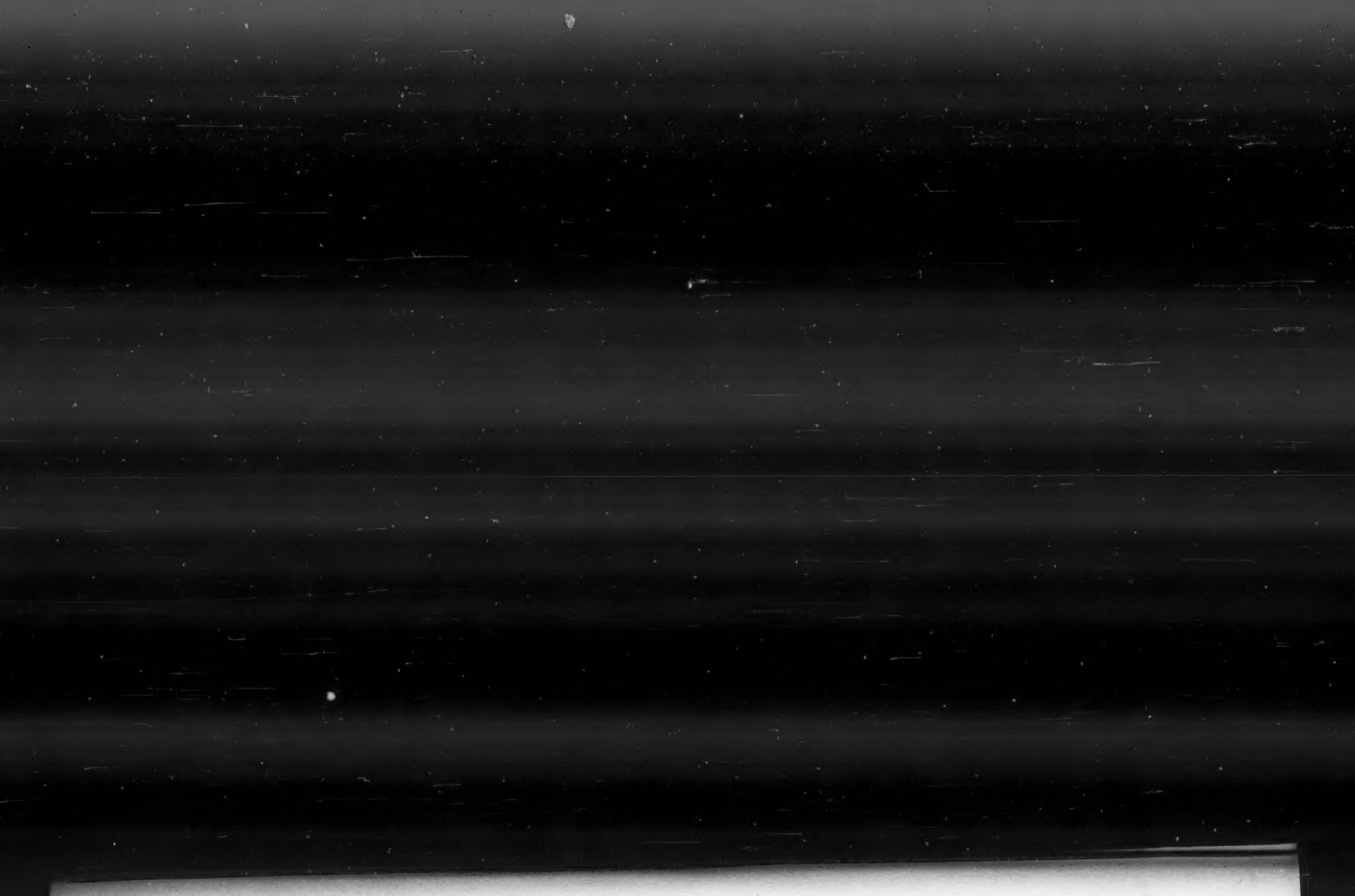
The book is attractively written and is a good example of what the author calls "scientific journalism." Most of the material is presented as answers to Mr. Wiggam's stimulating and well directed questions. The personality of each psychologist is brought out so vividly by the dialogue that the reader can feel the presence of the speaker. All in all, even though the author admits that it is not a systematic and complete presentation of psychology, it is a very serviceable book. To a student of psychology, it gives a different presentation of what he has studied in text-books. To the public, it gives information, much of it practical. To those who are interested in making science human, or making human beings more scientific, the book serves as a very good example of the necessary technique.

MODERN PSYCHOLOGY: NORMAL AND ABNORMAL

By Daniel Bell Leary. Philadelphia: J. B. Lippincott Company, 1928. Pp. 453

REVIEWED BY HENRY E. GARRETT

It is difficult to discover any very good reason for this tedious and poorly written book. Certainly it has little to offer either as a textbook for students or as a popular exposition of psychology for those in search of new thrills. To follow the author as he



sets out to study the genesis and development of personality, or in his own words to build up "a behaviorism of personality," it is necessary to toil through four "Parts" or sections and more than 400 pages in which there is little new either in material or in form of exposition. Probably the treatment of psychoanalysis and of the theories of Freud, Jung, Adler, and Kempf are the most satisfactory parts of the book; out these are by no means outstanding.

The mechanical make-up of the book is in keeping with its contents. Page follows page of closely written prose without a single table or illustration to break the monotony. There is practically no citation of exact experimental results; instead discussion and more discussion, argument and generalization. The bibliographies at the end of the chapters are reasonably satisfactory, but in many instances footnote references are so all-inclusive as to be practically useless. Thus, reference may be made to five or six authors by name only, as on page 133 where the reader is invited (besides Watson) to "compare" Platt, Titchener, Rignano, Broad, and Piéron; while in another place (page 129) he is referred to Titchener "in general." Would not it save space to refer the reader once for all to the Encyclopaedia Britannica? On page 157 Wiggam is cited as the authority on "correlated traits,"—which is dealt with in a page and a half.

The book gives one the impression of having been hastily and somewhat carelessly written. Many sentences are too long and too involved grammatically, while the author splits his infinitives with distressing regularity. Put in brief, this volume is simply another in that already too-long list of semi-popular "general" books on psychology, the main result of which to date has been to cheapen psychology and (sometimes) enrich the writer.

STANDARDS AND STANDARDIZATION

By Norman F. Harriman. New York: McGraw-Hill Book Company, 1928. Pp. 265

Reviewed by Arthur Howard Sutherland

"Standardization can be overdone" says the author. But the trend of the times, the requirements of consolidations and superconsolidations in industry, and increasing intolerance as to waste everywhere, indicate that much further effort at effective standardization will be expended.

Twenty countries have national standardizing bodies. The British Engineering Standards Association, organized for the purpose of furthering British industry and trade, has 420 committees, and the services without fee of some 2000 engineers and business men. The National Bureau of Standards of the United States is organized in 9 departments. A new development is the work of recent years in the standardization of commercial products. This group provides a friendly meeting place for producers, distributors and consumers. An International Bureau of Weights and Measures has been organized since 1875.

The book is devoted to physical standards, and to standardization of measurable qualities and characteristics of commodities and their measuring devices. It is an interesting, encyclopedic presentation of the present status of standardization work. The introduction is by Mr. Samuel M. Vauclain.

WHAT IS THE MIND?

By George Thomas White Patrick. New York: The Macmillan Company, 1929. Pp. 193

YOUR MIND IN ACTION: APPLICATIONS OF PSYCHOLOGY

By Fred A. Moss. Boston: Houghton Mifflin Company, 1929. Pp. 487

REVIEWED BY ARTHUR HOWARD SUTHERLAND

Shall Mind be regarded as a more or less inert and perhaps negligible result of physical and chemical processes? Shall it be studied as an immediate and present fact? Or shall it be studied in relation to its own creations and products,—as seen in inventions, constructions, literary, and artistic products? Dr. Patrick believes that the weight of evidence at present tends to push forward the claims of the latter point of view; that evolution is a creative process, and that Mind or Intelligence is the biological instrument by which civilization and its phenomena have come to pass. Behaviorism does not cover the field, in his view, but is a useful adjunct to other methods. He predicts that Behaviorism will eventually return to the fold, and that it may even assume the forms of idealism rather than its present materialism.

Dr. Moss, however, takes the view that Human Behavior is generally and specifically determined. Insufficient emphasis has been given to the effects of climate, altitude, and rays above and below the spectral limits. Sleep versus sleeplessness; fatigue versus alertness; hunger versus repletion; disease versus health,—represent conditions which have causes. Immediate effects can be seen, and to a degree differentiated, after taking drugs.

Individual differences are traceable to race, family, age, sex, training, other past experience peculiar to the individual, and especially to emotional outlets which have been found and habituated in each individual. The result is a complex but not highly integrated individual; and in consequence a complex and very slightly integrated society. The author's discussions emphasize the abnormal rather than the normal applications of psychological interests.

New Books

INDUSTRIAL AND LABOR RELATIONS

DAVISON, RONALD C. *The unemployed; old policies and new.* New York: Longmans, Green & Co., 1929. 305 p. $4.00.

DUNN, ROBERT WILLIAMS. *Labor and automobiles.* New York: International Publishers, 1929. 224 p. $2.00.

HILLER, E. T. *The strike.* Chicago: University of Chicago Press, 1928. 304 p. $2.50.

JACKS, LAWRENCE PEARSALL. *My neighbor the universe; a study of human labor.* New York: G. P. Putnam's Sons, 1929. 114 p. $1.50.

LAUCK, WILLIAM JETT. *The new industrial revolution and wages.* New York: Funk & Wagnalls Co., 1929. 317 p. $2.50.

MEAKIN, WALTER. *The new industrial revolution; a study for the general reader of rationalisation and post war tendencies of capitalism and labor.* New York: Brentano's. 284 p. $3.00.

MORRIS, M. C. A. *The British workman, past and present.* New York: Oxford University Press, 1928. 174 p. $2.50.

National Industrial Conference Board. *Industrial relations programs in small plants.* New York: Author, 1928. 55 p. $1.50.

NUSSBAUM, ARTHUR, ed. *International year book on civil and commercial arbitration.* Vol. 1. New York: Oxford University Press, 1928. 434 p. $4.25.

RAYNER, ROBERT M. *The story of trade unionism, from the Combination Acts to the General Strike.* New York: Longmans, Green & Co., 1929. $2.50.

THOMPSON, LAURA AMELIA, comp. *Injunctions in labor disputes; select list of recent references.* Washington, D. C.: Government Printing Office, 1928. 19 p. Gratis.

WARE, NORMAN. *The labor movement in the United States, 1860–1895; a study in democracy.* New York: D. Appleton & Co., 1929. 427 p. $3.00.

World Peace Foundation. *Industry, governments and labor.* Boston: Author, 1928. 250 p. $2.00.

VOCATIONAL INFORMATION AND VOCATIONAL GUIDANCE

BEZANSON, ANNE. *Earnings and working opportunities in the upholstery weavers trade in twenty-five plants in Philadelphia; an experiment in cooperative research.* Philadelphia: University of Pennsylvania Press, 1928. 150 p. $2.50.

BROWN, LELA T. AND IRWIN, ROBERT B. *Insurance underwriting; a study of the business in its relation to blind agents.* New York: American Foundation for the Blind, 1928. 52 p. 50¢.

COHEN, I. DAVID. *Principles and practices of vocational guidance.* New York: Century Co., 1929. 494 p. $3.00.

COYLE, GRACE L. *Present trends in clerical occupations.* New York: Womans Press, 1928. 44 p. 75¢.

CRAWFORD, ALBERT BEECHER. *Incentives to study; a survey of student opinion.* New Haven, Conn.: Yale University Press, 1929. 206 p. $5.00.

ERNST, CLAYTON HOLT, AND WHITE, TRENTWELL MASON, eds. *Opportunity ahead!* New York: D. Appleton & Co., 1929 ('22–'29). 195 p. $1.50.

HALL, HERBERT JAMES, AND KNOX, MERTICE MACRAE BUCK. *Handicrafts for the handicapped.*, rev. ed. New York: Dodd, Mead & Co., 1928. $2.50.

JACKSON, DUGALD C., JR., AND JONES, W. PAUL. *The profession of engineering.* New York: John Wiley & Sons, 1929. 124 p. $1.50.

JONES, JANE LOUISE. *A personnel study of women deans in colleges and universities.* New York: Teachers College, Columbia University, 1928. 155 p. $1.50.

PARKER, W. E., AND MOYER. D. H. *Vocational information; a bibliography for college and high school students.* Ann Arbor: University of Michigan Press, 1928. 50¢.

PERSONS, WARREN MILTON. *The construction of index numbers.* Boston: Houghton, Mifflin Co., 1928. $1.25.

RUDISILL, EARL STOCKSLAGER. *The intimate problems of youth; a series of studies of youth and their leaders.* New York: Macmillan Co., 1929. 217 p. $2.00.

STETSON, FRED LEA, AND HUFFAKER, C. L. *Pupil counseling in grades seven to twelve.* Eugene: University of Oregon Press, 1928. 21 p. Apply.

STEWART, ESTELL MAY. *Apprenticeship in building construction.* Washington, D. C.: Government Printing Office, 1928. 138 p. 20¢.

U. S. Federal Board for Vocational Education. *A course in farm shop work for teachers of vocational agriculture.* Washington, D. C.: Government Printing Office, 1928. 13 p. 5¢.

U. S. Library of Congress, Division of Manuscripts. *Notes on the care, cataloguing, calendaring and arranging of manuscripts; 3d edition.* Washington, D. C.: Government Printing Office, 1928. 47 p. Gratis.

WILLIAMS, MARGUERITA P., AND HAMMER, LEE F., comps. *Directory of training courses for recreation leaders.* New York: Russell Sage Foundation, 1928. 69p. 50¢.

Yale University Department of Personnel Study. *The choice of an occupation.* New Haven, Conn.: Author, 1929. 227 p. Apply.

EDUCATION

BIXLER, HAROLD HENCH. *Check lists for educational research.* New York: Teachers College, Columbia University, 1928. 130 p. $1.50.

CLARK, HAROLD FLORIAN, comp. *The economic effects of education as shown by statements of economists.* Bloomington, Ind.: University Bureau of Research, 1928. 39 p. Apply.

COX, PHILIP, W. L., and others. *Objectives of education; second year book of the National Society for the Study of Educational Sociology.* New York: Teachers College, Columbia University, 1929. 191 p. Apply.

Department of the Interior, Bureau of Education. *Biennial survey of education, 1924–1926.* Washington, D. C.: Government Printing Office, 1928. 1207 p. $2.30.

DOUGLASS, HARL R., and others. *Controlled experimentation in the study of methods of college teaching.* Eugene: University of Oregon Press, 1929. 50 p. $1.00.

DUDGEON, M. S. *The worker and the library.* Chicago: American Library Association, 1929. $1.50 per 100 copies.

EDDY, GEORGE SHERWOOD, ed. *Am I getting an education?* Garden City, N. Y.: Doubleday, Doran & Co., 1929. 92 p. $1.00.

GIDDINGS, FRANKLIN HENRY. *The mighty medicine; superstition and its antidote; a new liberal education.* New York: Macmillan Co., 1929. 147 p. $2.50.

GRAY, WILLIAM SCOTT, AND MUNROE, RUTH. *The reading interests and habits of adults; a preliminary report.* New York: Macmillan Co., 1929. 318 p. $3.50.

HART, JOSEPH KINMONT. *A social interpretation of education.* New York: Henry Holt & Co., 1929. 478 p. $4.50.

HARRY, DAVID P. *Cost of living of teachers in the state of New York.* New York: Teachers College, Columbia University, 1928. 190 p. $1.75.

HENIG, MAX SOLOMON. *Safety education in the vocational school; the construction of a curriculum for accident prevention.* New York: National Bureau of Casualty & Surety Underwriters, 120 West 42d Street, 1928. 116 p. $1.40.

JONES, LANGE, G. E. *Negro schools in the southern states.* New York: Oxford University Press, 1929. 160 p. $3.50.

LINSCHEID, ADOLPH. *In-service improvement of the state teachers college faculty.* New York: Teachers College, Columbia University, 1928. 100 p. Apply.

MARSHALL, LEON CARROLL, ed. *The collegiate school of business; its status at the close of the first quarter of the twentieth century.* Chicago: University of Chicago Press, 1928. 477 p. $4.00.

MECREDY, MARY FLORENCE, ed. *Developments in part-time education in California.* Berkeley: University of California Press, 1928. 32 p. Apply.

MONROE, WALTER S., and others. *Ten years of educational research, 1918–1927.* Urbana: University of Illinois College of Education, 1928. 367 p. Apply.

National Education Association. *Can the nation afford to educate its children?* Washington, D. C.: Author, 1928. 34 p. 25¢.

National Education Association. *Can the states afford to educate their children?* Washington, D. C.: Author, 1929. 40 p. 25¢.

National Society of College Teachers of Education. *Current educational readjustments in higher institutions; 17th yearbook.* Chicago: University of Chicago Press, 1928. 183 p. $3.00.

PAYSON, VERNA M., AND HALEY, ALICE H. *Adult education in homemaking.* New York: Century Co., 1929. 268 p. $2.25.

REALS, WILLIS HOWARD. *A study of the summer high school; with a detailed analysis of the achievement in two summer high schools.* New York: Teachers College, Columbia University, 1928. 94 p. $1.50.

Rockefeller Foundation, Division of Medical Education. *Methods and problems of medical education.* New York: Author, 1928. 386 p. Apply.

SHULTZ, IRWIN TABOR. *A descriptive and predictive study of a class in a school of education.* Philadelphia: Westbrook Publishing Co., 1928. 131 p. Gratis.

STREBEL, RALPH F., AND MOREHART, GROVER C. *The nature and meaning of teaching.* New York: McGraw-Hill Book Co., 1929. 266 p. $2.50.

U. S. Federal Board for Vocational Education. *Coöperative part-time education; the*

present status of coöperative schools and classes in the United States. Washington, D. C.: Government Printing Office, 1928. 42 p. Apply.

WILLIAMS, LEWIS WARD. *Supply and demand as applied to high school teachers.* Urbana: University of Illinois, 1928. 11 p. Apply.

WOOD, THOMAS DENISON, AND LERRIGO, MARION O. *Teaching how to get and use human energy.* Bloomington, Ill.: Public School Publishing Co., 1928. 135 p. 75¢.

WOODRING, MAXIE NAVE, and others. *Enriched teaching of science in the high school.* New York: Teachers College, Columbia University, 1928. 385 p. $2.75.

WRIGHT, J. C., AND ALLEN, C. R. *Efficiency in Education.* New York: John Wiley & Sons, 1929. 400 p. $3.00.

ZACHRY, CAROLINE B. *Personality adjustments of school children.* Introduction by William Heard Kilpatrick. New York: Chas. Scribner's Sons, 1929. 319 p. $1.80.

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ANDERSON, NELS, AND LINDEMAN, EDUARD C. *Urban Sociology.* New York: A. A. Knopf, Inc., 1928. 426 p. $3.25.

CLEVELAND, FREDERICK A, ed. *Modern scientific knowledge of nature, man and society.* New York: Ronald Press, 1929. 618 p. $4.50.

HOPKINS, MARY DELLA. *The employment of women at night.* Washington, D. C.: Government Printing Office, 1928. 91 p. 15¢.

HERRING, HARRIET L. *Welfare work in mill villages; the story of extra-mill activities in North Carolina.* Chapel Hill: University of North Carolina Press, 1929. 417 p. $5.00.

KELSO, ROBERT WILSON. *Poverty.* New York: Longmans, Green & Co., 1929. 382 p. $2.00.

LANDMAN, ISSAC, ed. *Christian and Jew; a symposium for better understanding.* New York: Horace Liveright, 1929. 383 p. $3.00.

LASKER, BRUNO. *Race attitudes in children.* New York: Henry Holt & Co., 1929. 410 p. $4.00.

LOBSENZ, JOHANNA. *The older woman in industry.* New York: Chas. Scribner's Sons, 1929. 297 p. $2.50.

MCGILL, NETTIE PAULINE. *Children in street work.* Washington, D. C.: Government Printing Office, 1928. 362 p. 50¢.

ROBINSON, CLAUDE E. *Child workers in two Connecticut towns, New Britain and Norwich.* New York: National Child Labor Committee, 1929.

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